US011307617B2

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Ko et al.

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(45) **Date of Patent: Apr. 19, 2022**

(54) **ROLLABLE ELECTRONIC DEVICE INCLUDING CLEARANCE COMPENSATION STRUCTURE**

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(73) Assignee: **Samsung Electronics Co., Ltd.**, Suwon-si (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
G06F 1/16 (2006.01)

(52) **U.S. Cl.**
CPC ***G06F 1/1652*** (2013.01)

(58) **Field of Classification Search**
CPC G06F 1/1652; G09F 9/301
See application file for complete search history.

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Assistant Examiner — Sagar Shrestha
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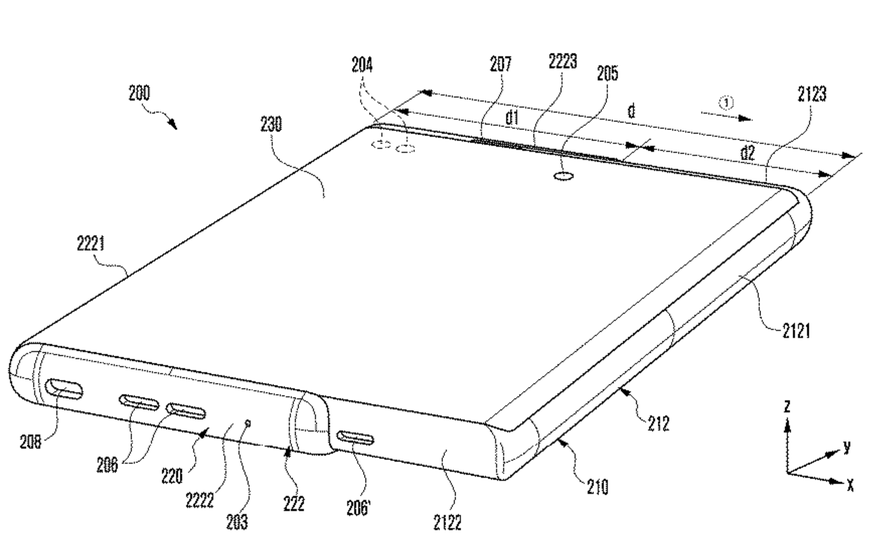
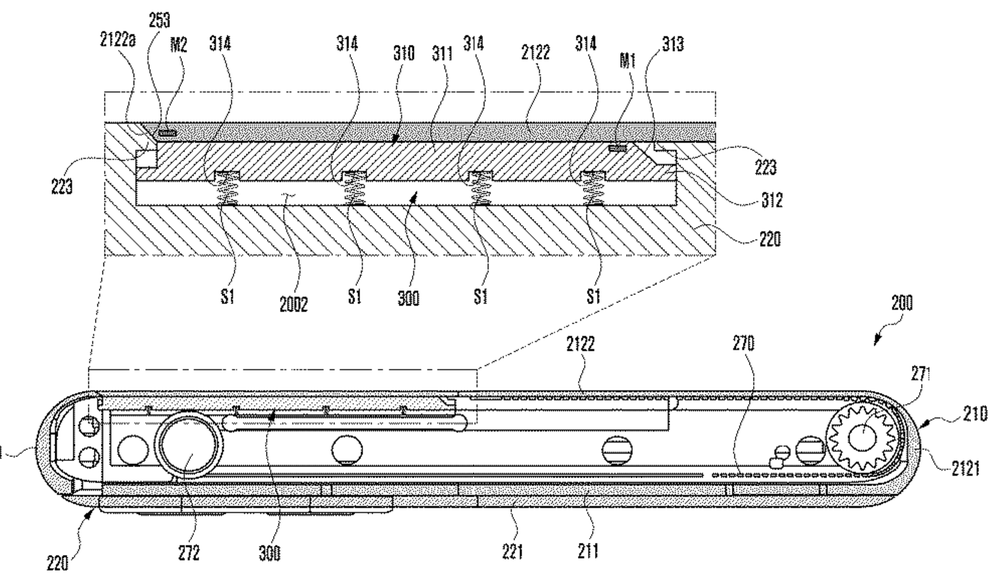
(57) **ABSTRACT**

According to certain embodiments, an electronic device comprises a first housing comprising a first plate having a first surface and a second surface facing away from the first surface, and a first side frame forming a first space and at least partially surrounding the first plate; and a second housing comprising a second plate comprising a third surface facing a same direction as the first surface and a fourth surface facing away from the third surface, and a second side frame forming a second space and at least partially surrounding the second plate, wherein at least a portion of the first side frame of the first housing is coupled to at least a portion of the second side frame to be slidable in a first direction, and the first housing movable between a slide-out state and a slide-in state relative to the second housing; a flexible display comprising: a first portion extending across at least a portion of the third surface; and a second portion extending from the first portion and located in the first space in the slide-in state of the first housing, wherein, when the first housing is switched from the slide-in state to the slide-out state, at least a portion of the second portion is exposed to an outside so as to form a substantially same plane as the first portion; and a clearance compensation
(Continued)





structure disposed in the second space and configured to at least partially cover a clearance space generated between the second side frame and the flexible display when the first housing is switched from the slide-in state to the slide-out state.

20 Claims, 30 Drawing Sheets

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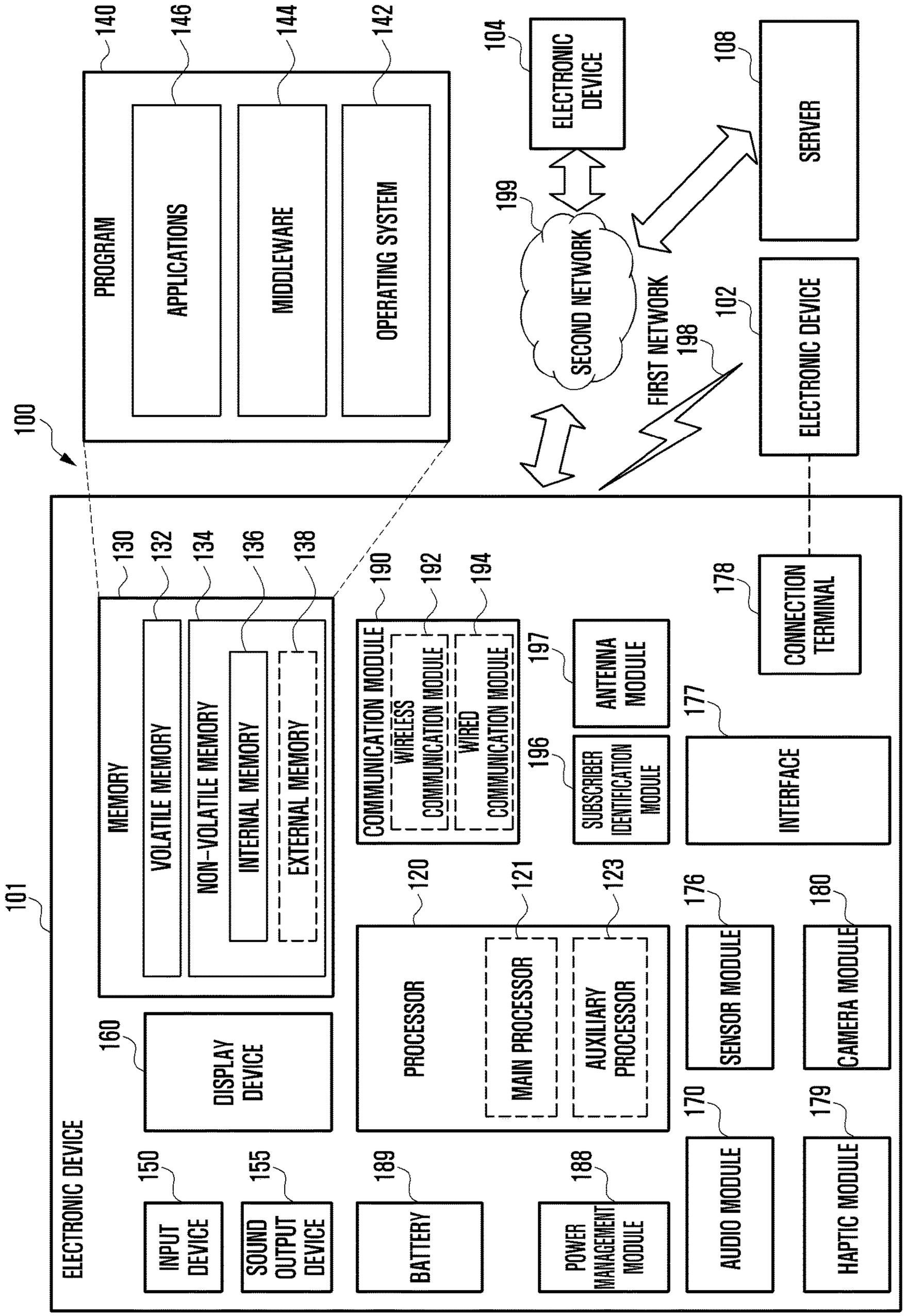
FIG. 1


100
101
ELECTRONIC DEVICE
PROGRAM
140
APPLICATIONS
146
MIDDLEWARE
144
OPERATING SYSTEM
142
MEMORY
130
VOLATILE MEMORY
132
NON-VOLATILE MEMORY
134
INTERNAL MEMORY
136
EXTERNAL MEMORY
138
INPUT DEVICE
150
SOUND OUTPUT DEVICE
155
DISPLAY DEVICE
160
BATTERY
189
POWER MANAGEMENT MODULE
188
COMMUNICATION MODULE
190
WIRELESS COMMUNICATION MODULE
192
WIRED COMMUNICATION MODULE
194
SUBSCRIBER IDENTIFICATION MODULE
196
ANTENNA MODULE
197
CONNECTION TERMINAL
178
INTERFACE
177
PROCESSOR
120
MAIN PROCESSOR
121
AUXILIARY PROCESSOR
123
SENSOR MODULE
176
AUDIO MODULE
170
CAMERA MODULE
180
HAPTIC MODULE
179
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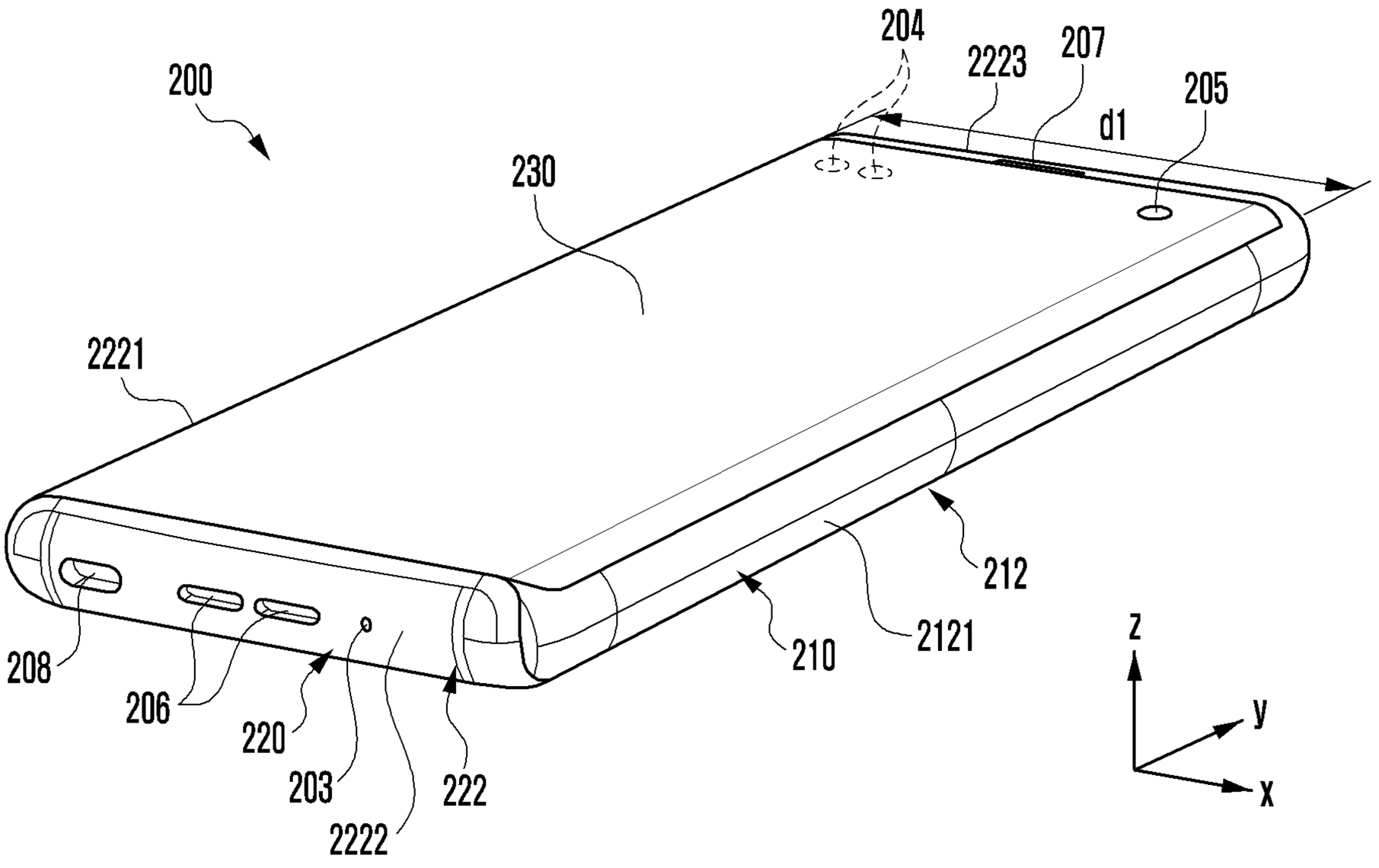
ELECTRONIC DEVICE
199
SECOND NETWORK
FIRST NETWORK
198
108
SERVER
102
ELECTRONIC DEVICE

FIG. 2A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2221
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203
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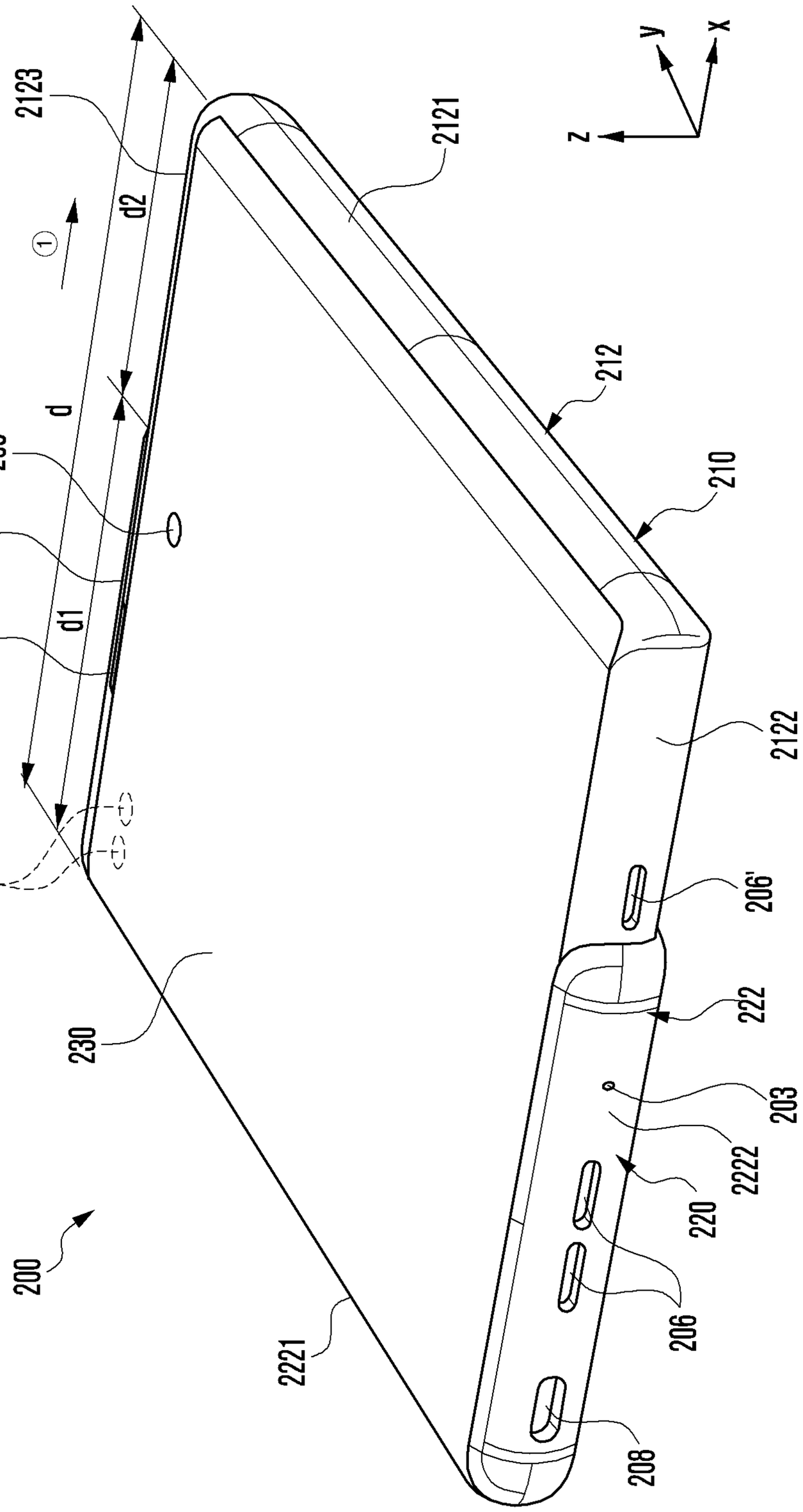
z
y
x

FIG. 2B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2121
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x
z
①
d2
d
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d1
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212
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2122
206'
222
203
2222
220
206
208
2221
200

FIG. 3A

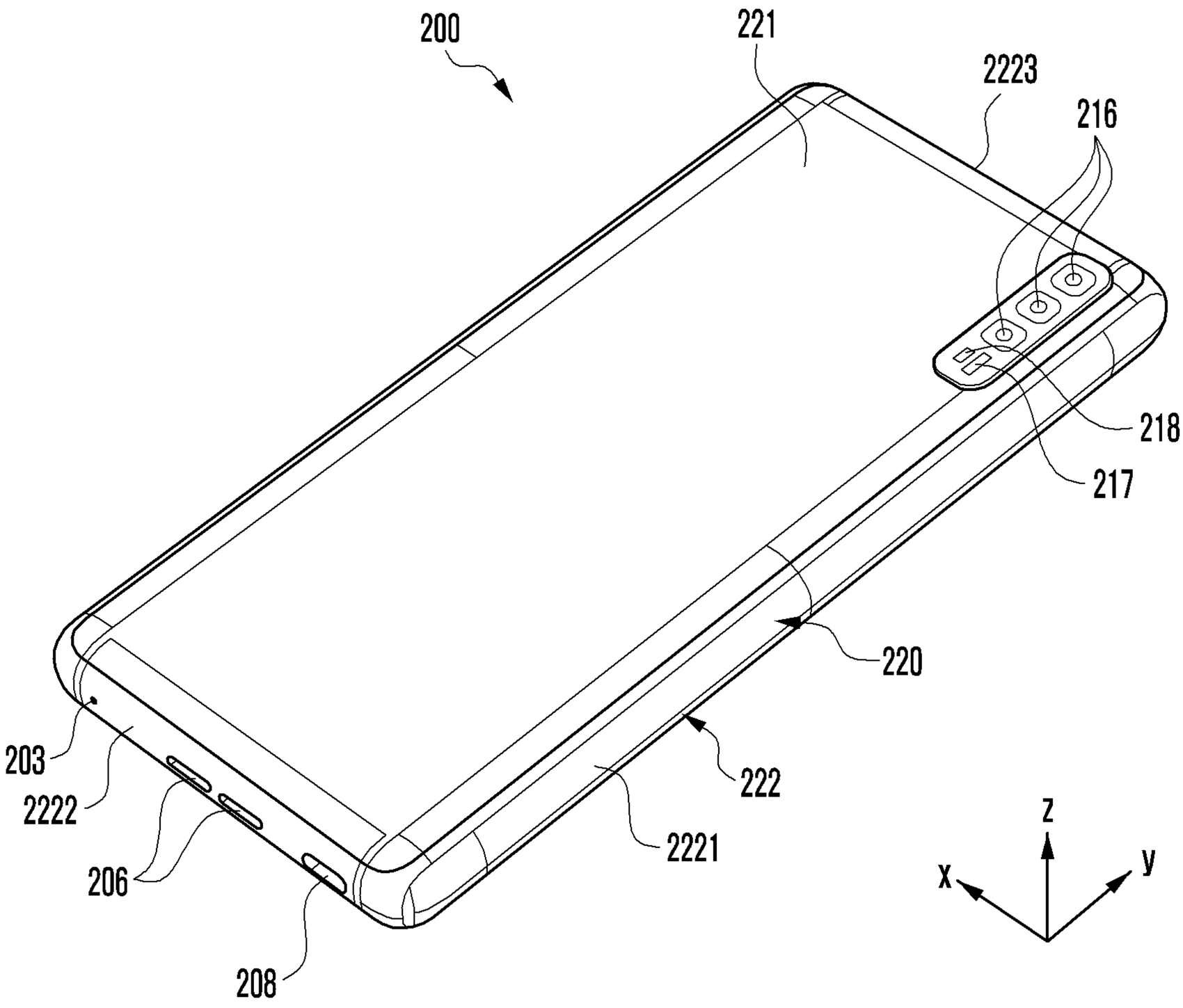
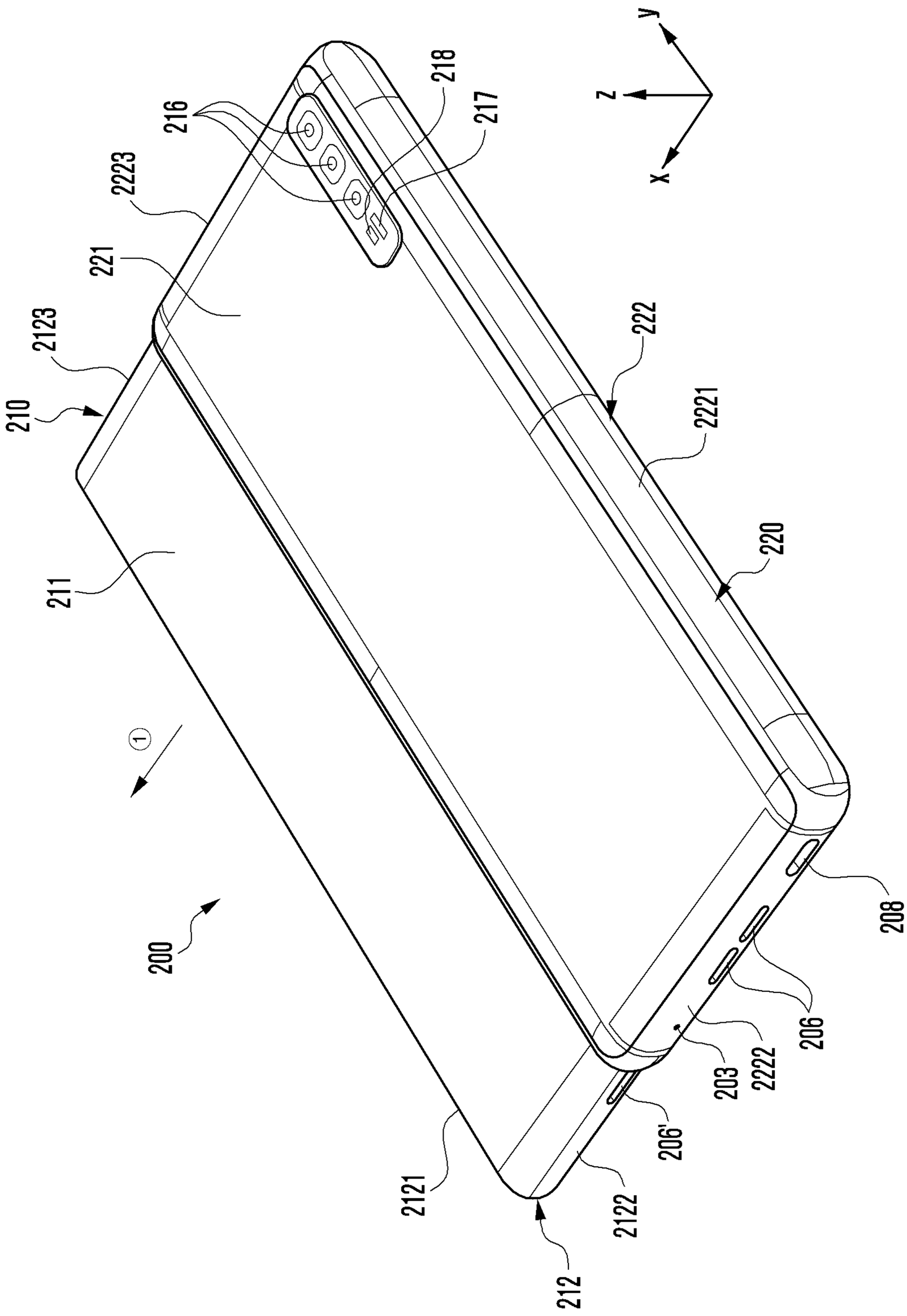


FIG. 3B


y
z
x
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218
217
2223
221
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2221
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206
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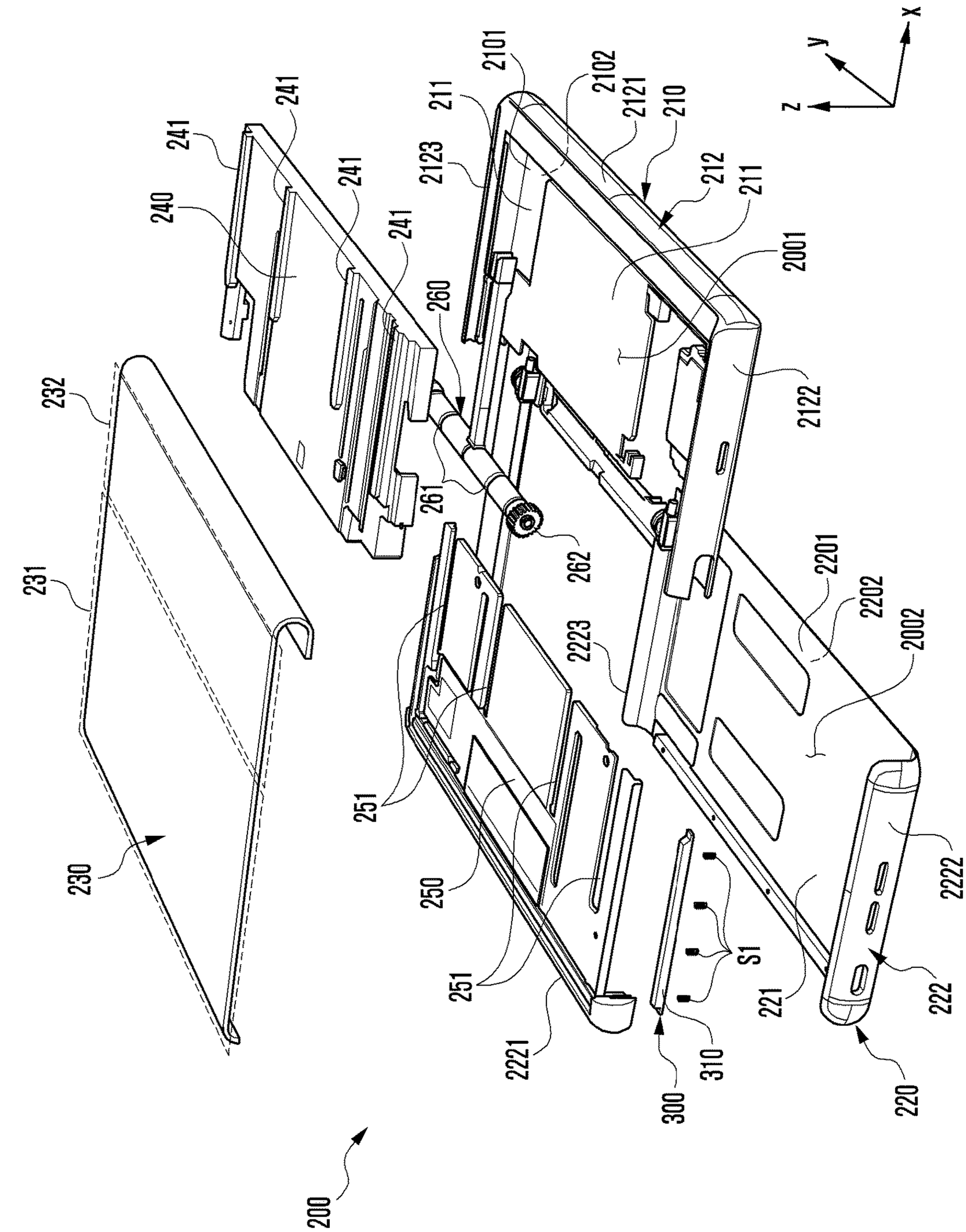
2222
206'
2121
2122
212
200
①

FIG. 4A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2101
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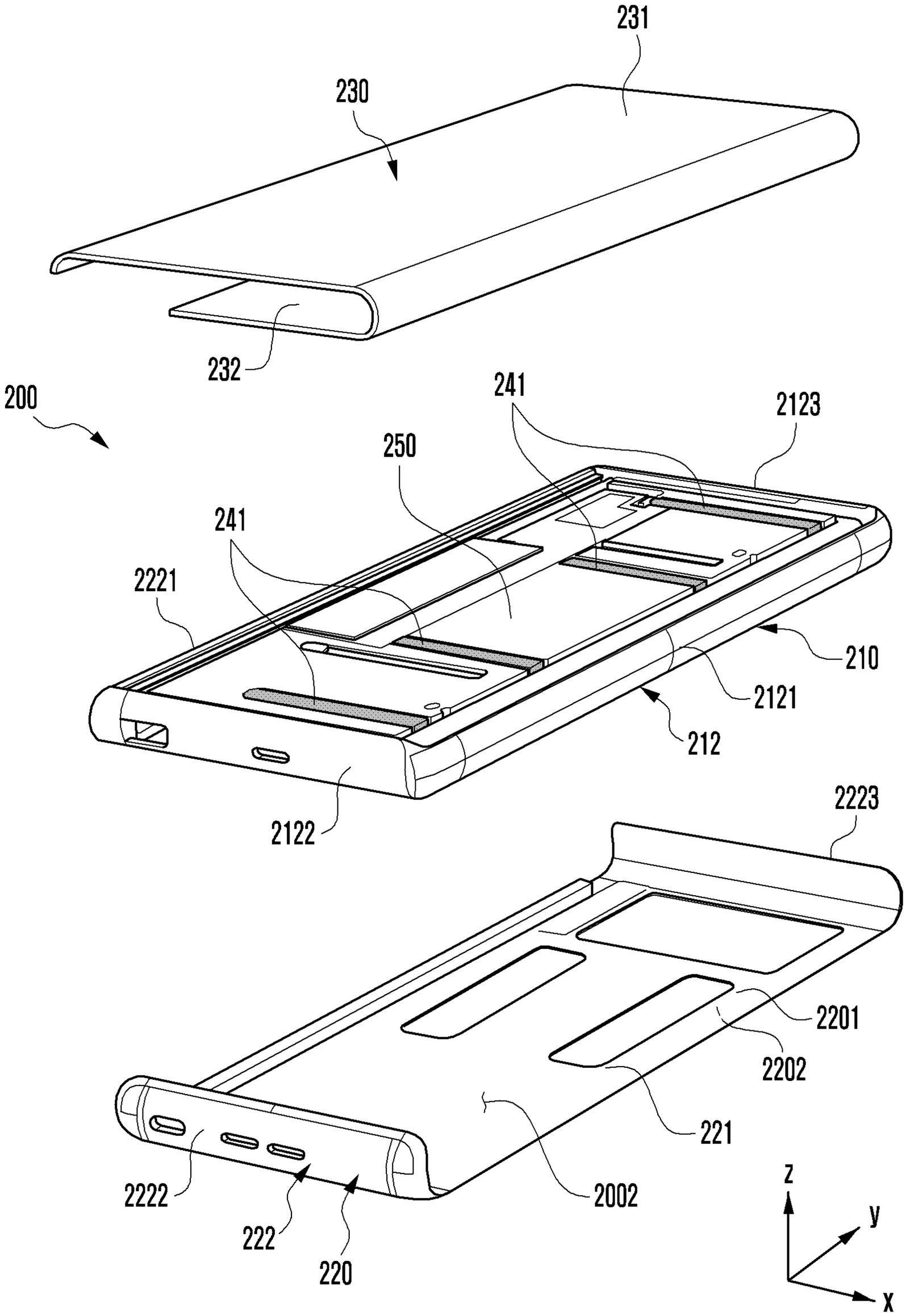
2123
212
211
2001
2122
2201
2202
2002
2223
2222
2221
300
310
S1
221
220
z
y
x

FIG. 4B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232
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241
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2201
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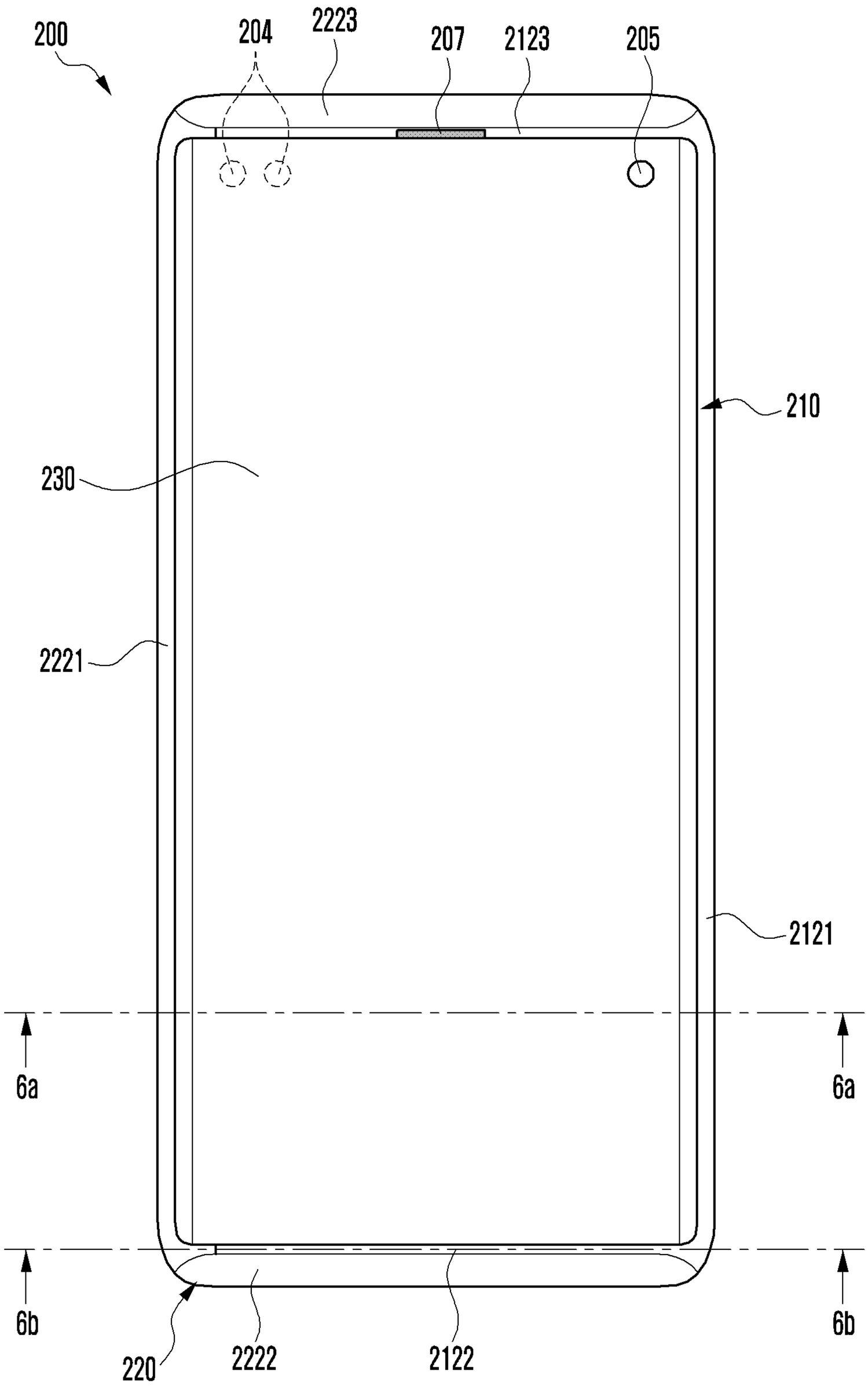
2222
222
220
2002
z
y
x

FIG. 5A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6a
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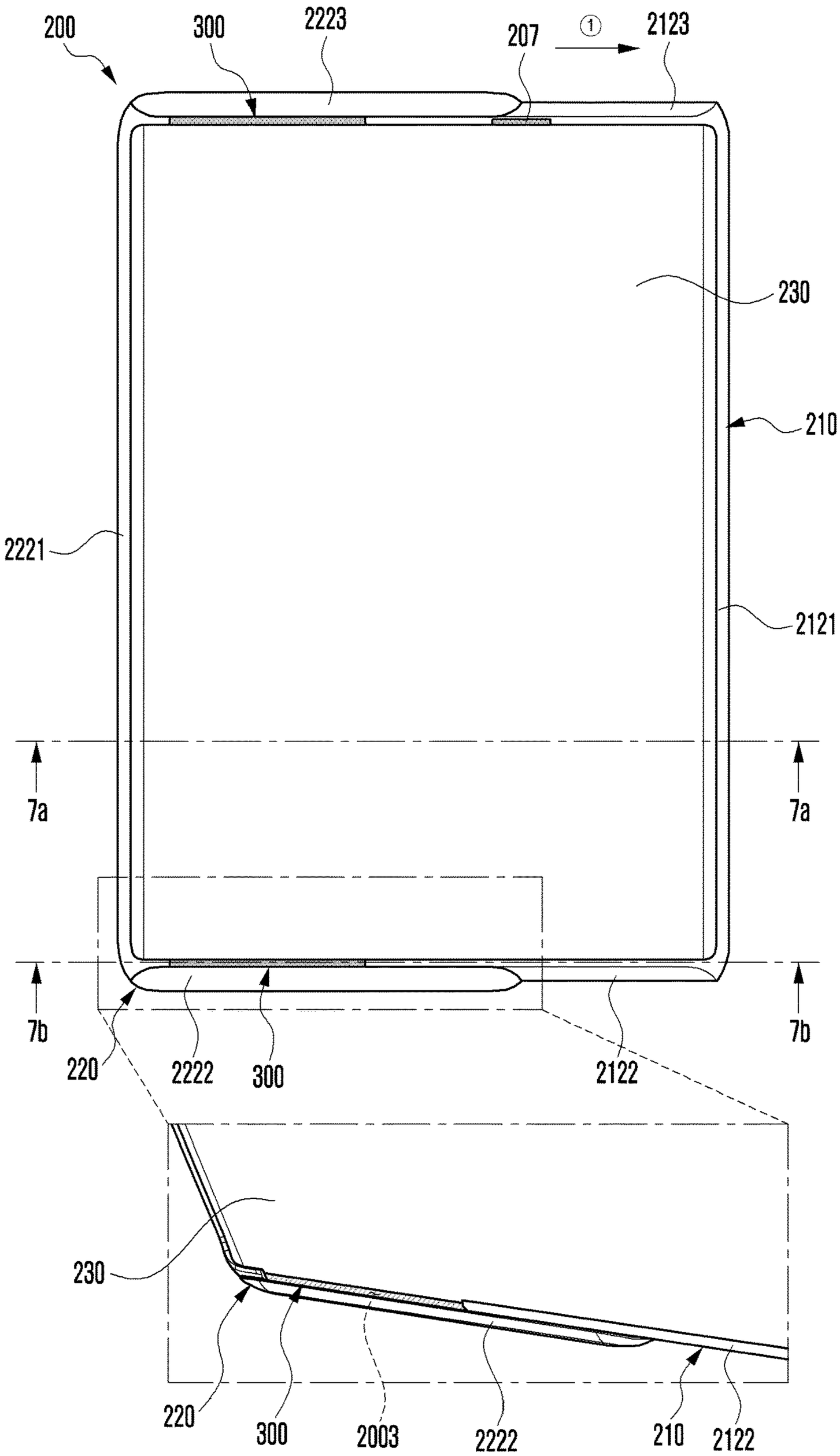
2122

FIG. 5B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2222
210
2122

FIG. 6A

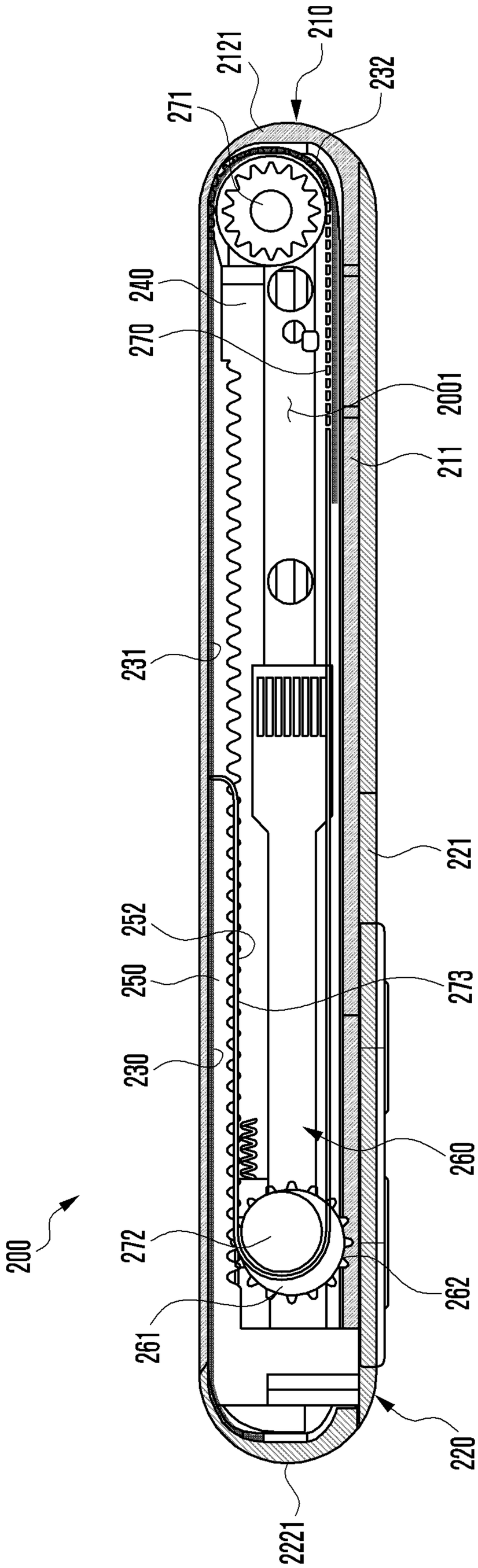
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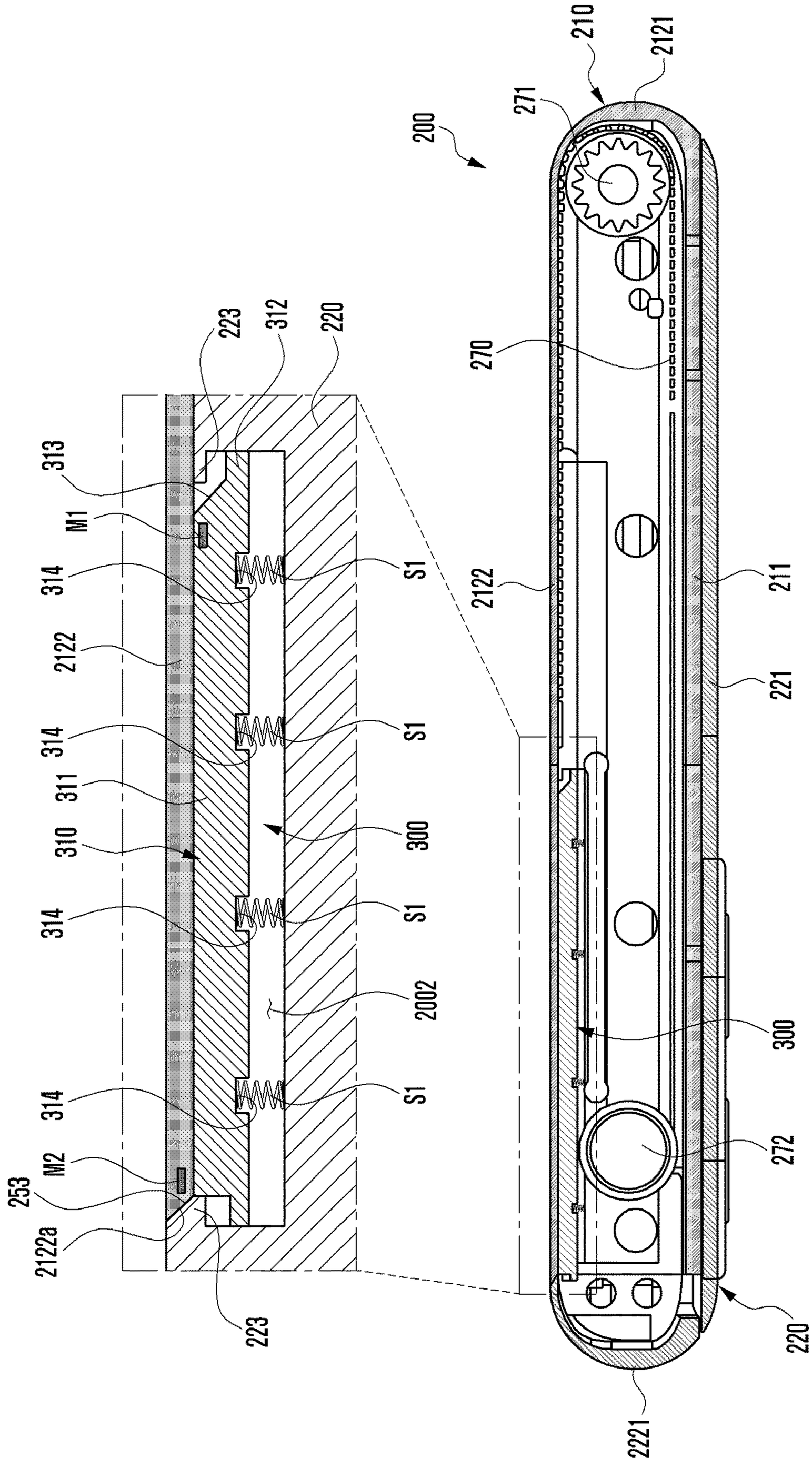
FIG. 6B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2121
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300
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2221
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220
313
M1
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S1
2122
314
S1
311
310
300
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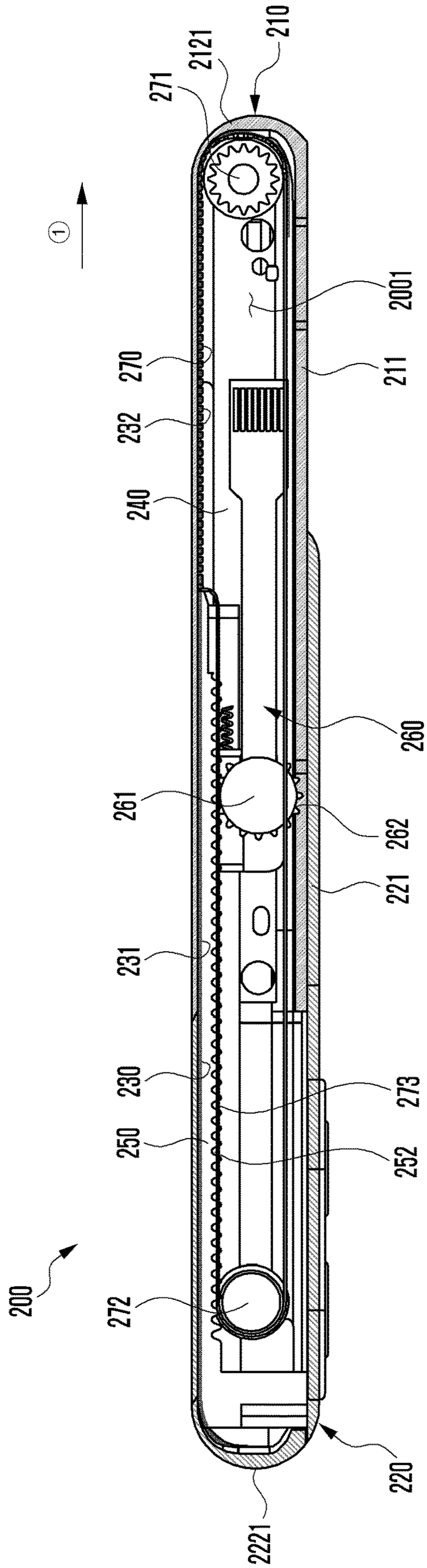
S1
2002
314
S1
M2
253
2122a
223

FIG. 7A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2121
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2001
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232
240
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262
221
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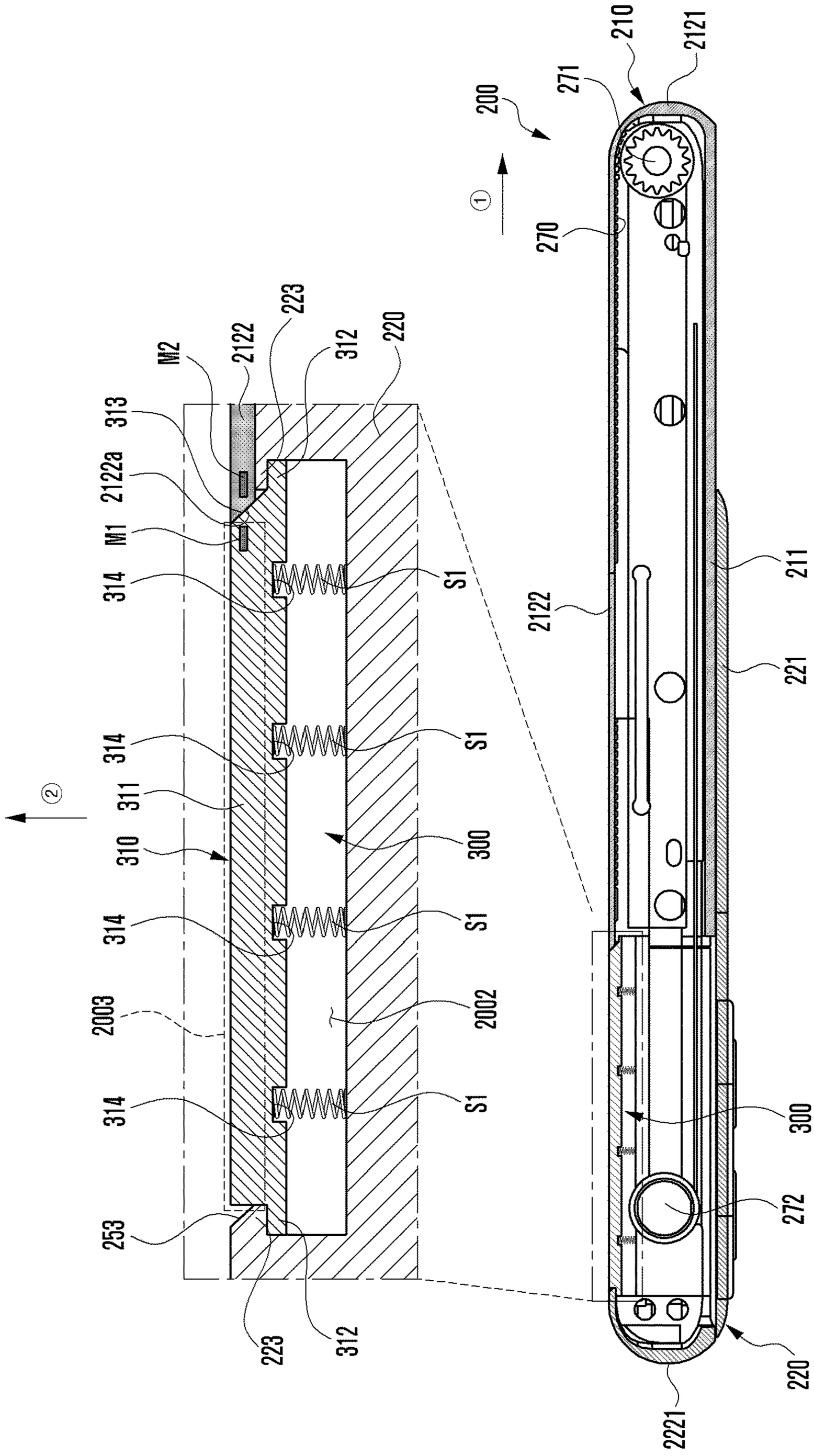
230
273
250
252
200
272
220
2221

FIG. 7B


200
210
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①
②
M2
2122
223
312
220
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2122a
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2002
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2122
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221
272
2221

FIG. 8A

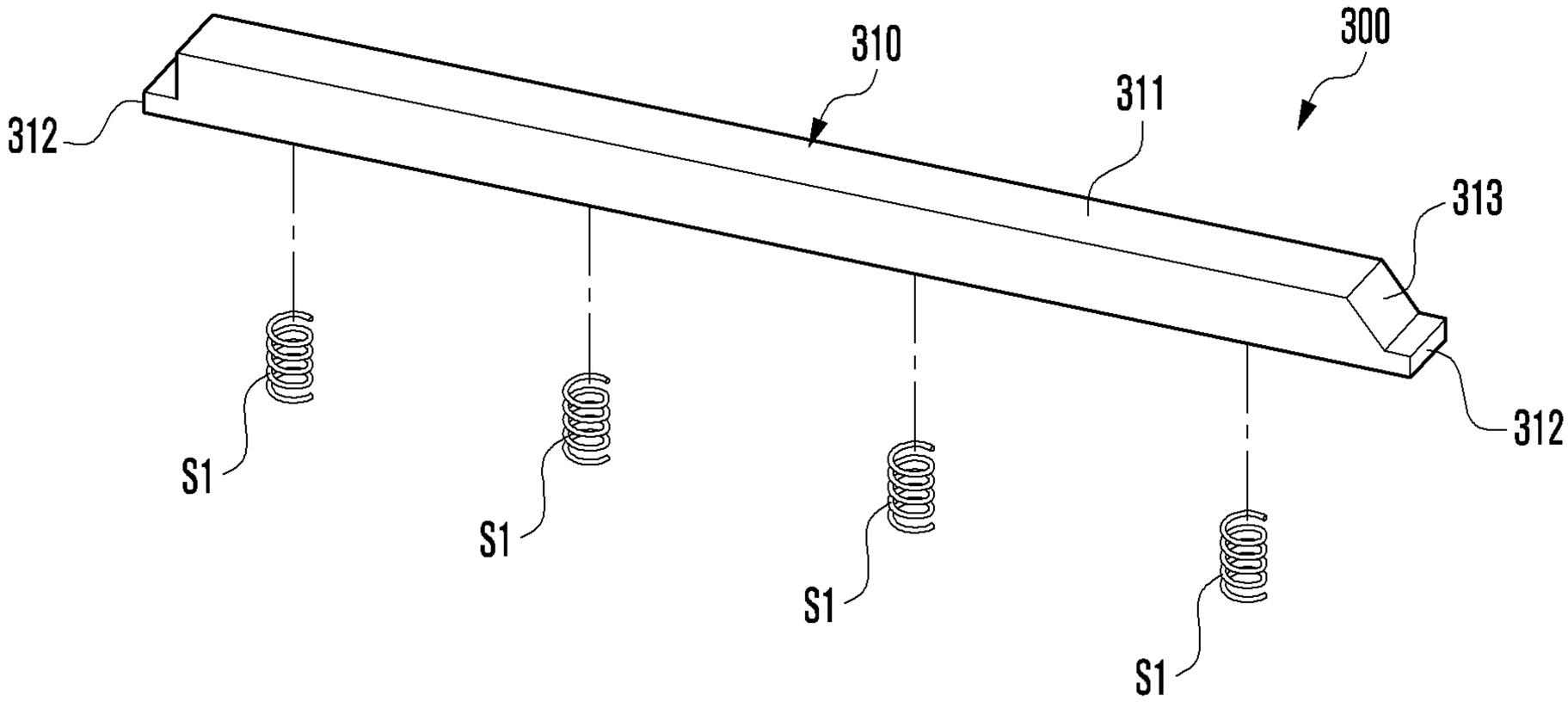


FIG. 8B

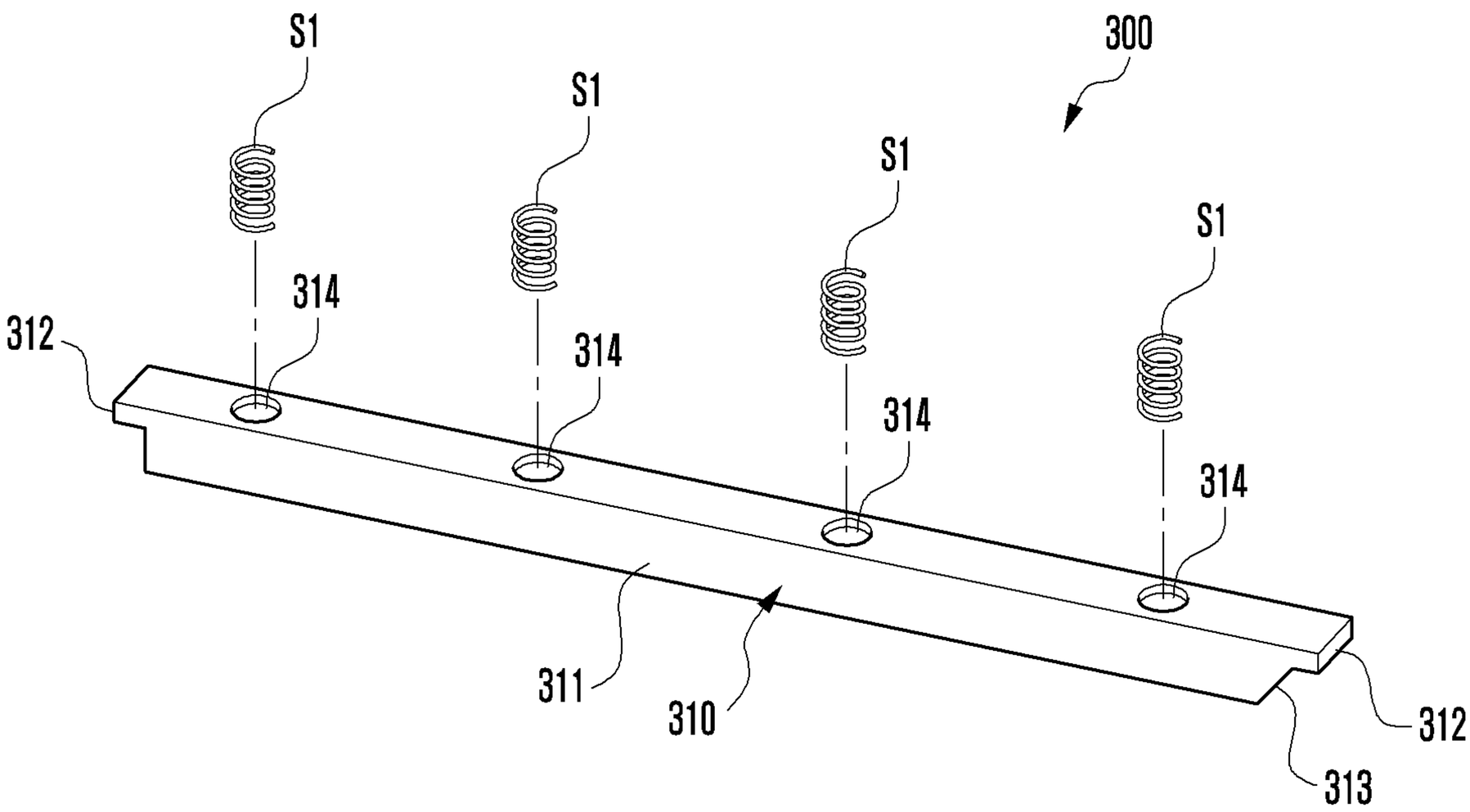
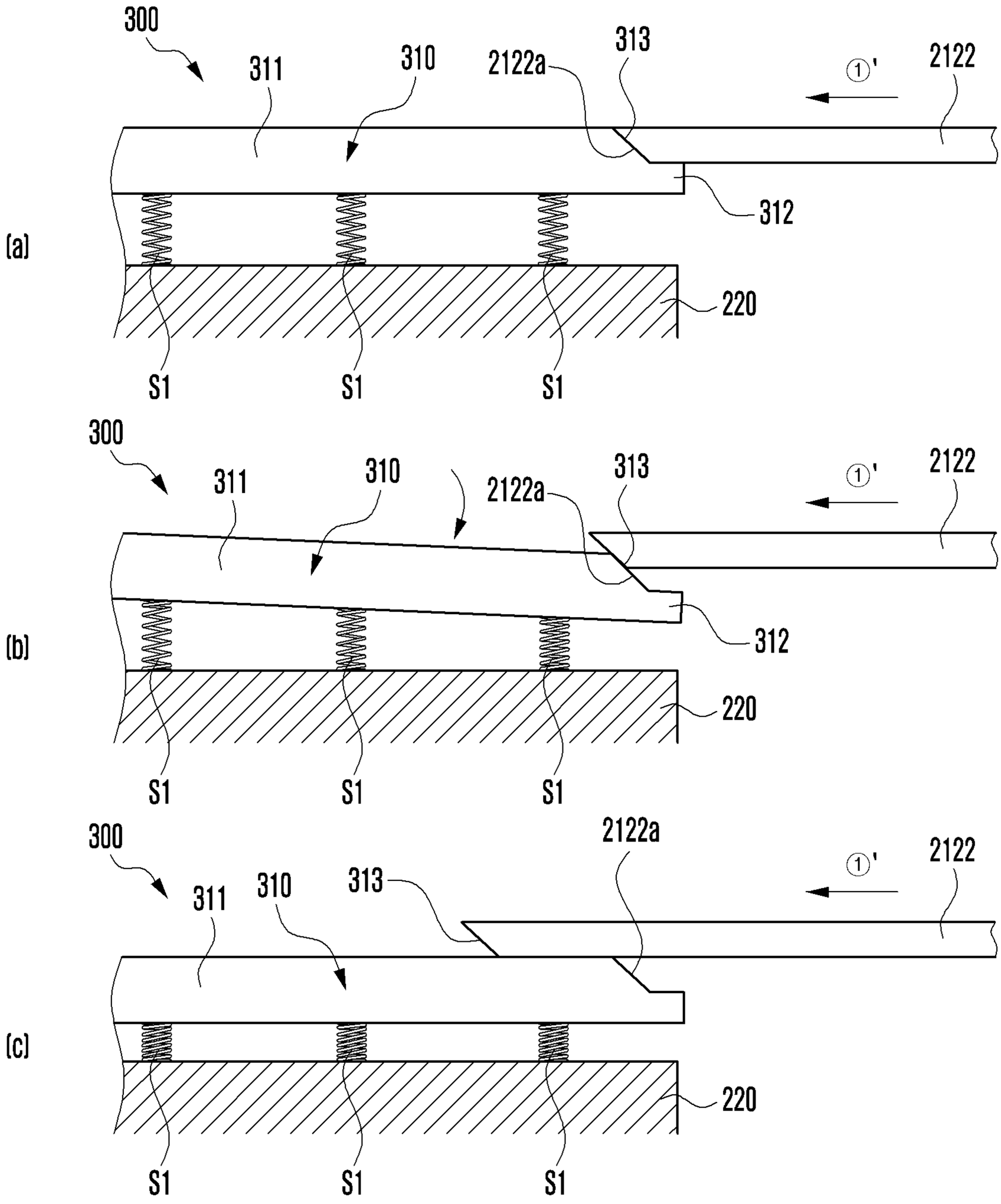


FIG. 9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①'
2122
312
220
S1
S1
S1
(b)
300
311
310
2122a
313
①'
2122
312
220
S1
S1
S1
(c)
300
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①'
2122
220
S1
S1
S1

FIG. 10A

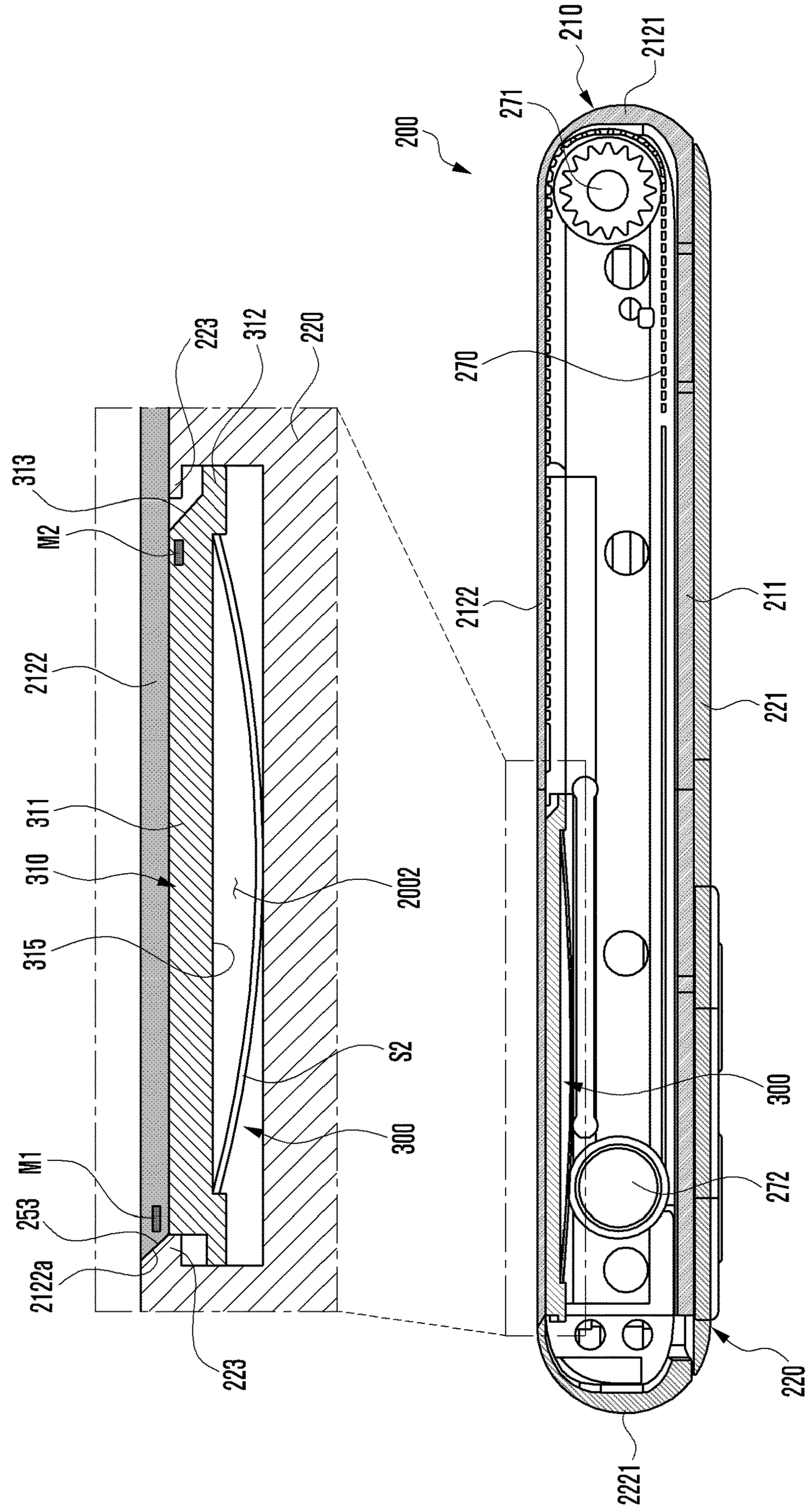
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FIG. 10B

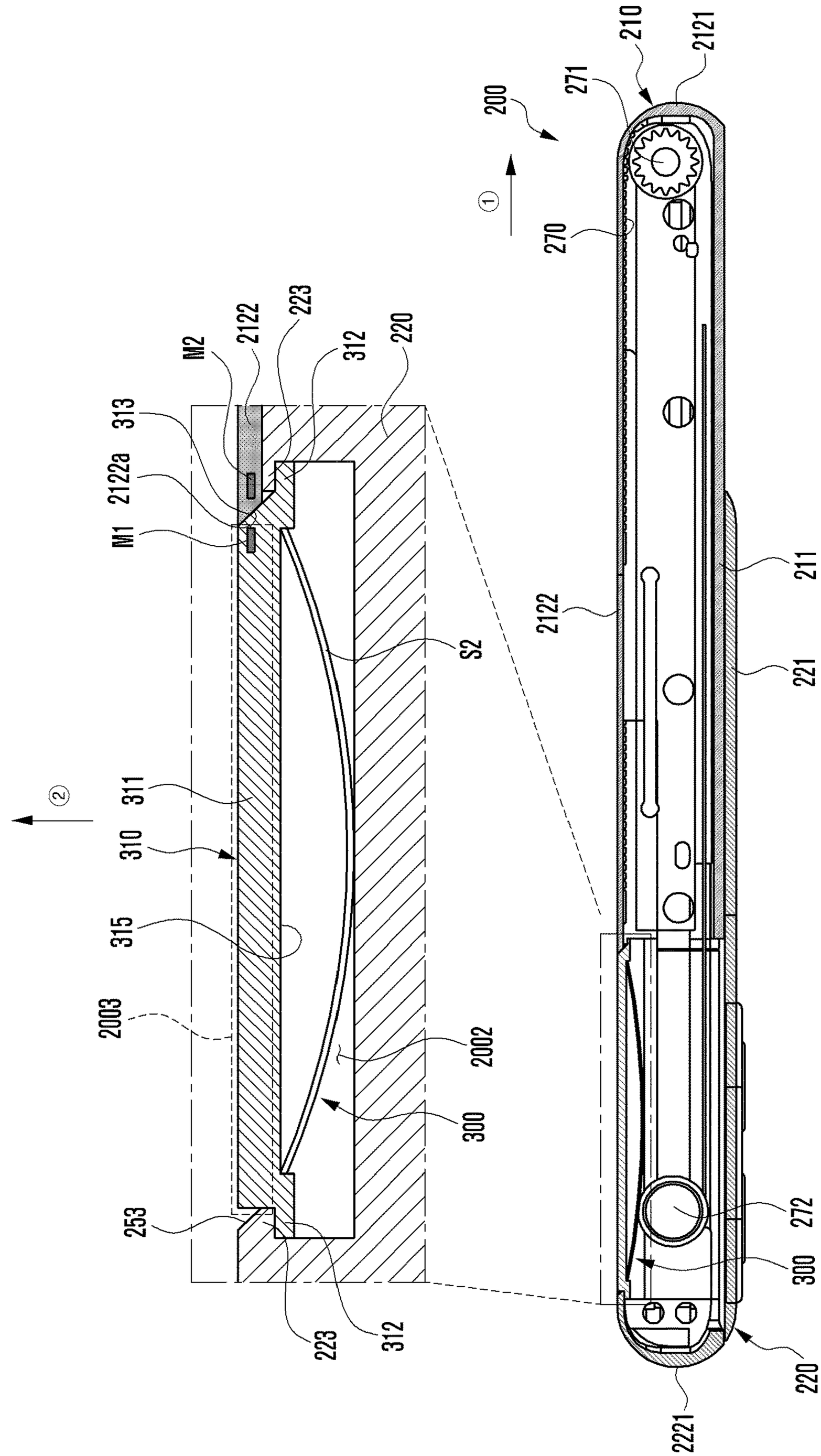
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FIG. 11A

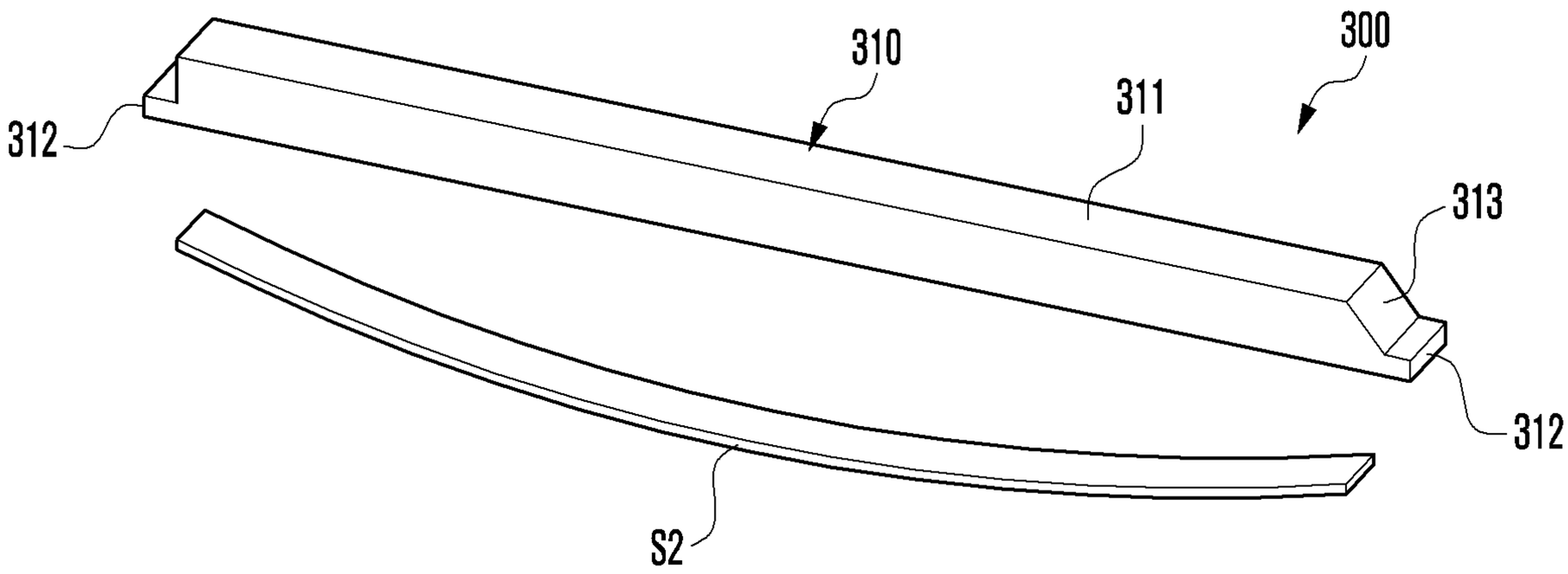


FIG. 11B

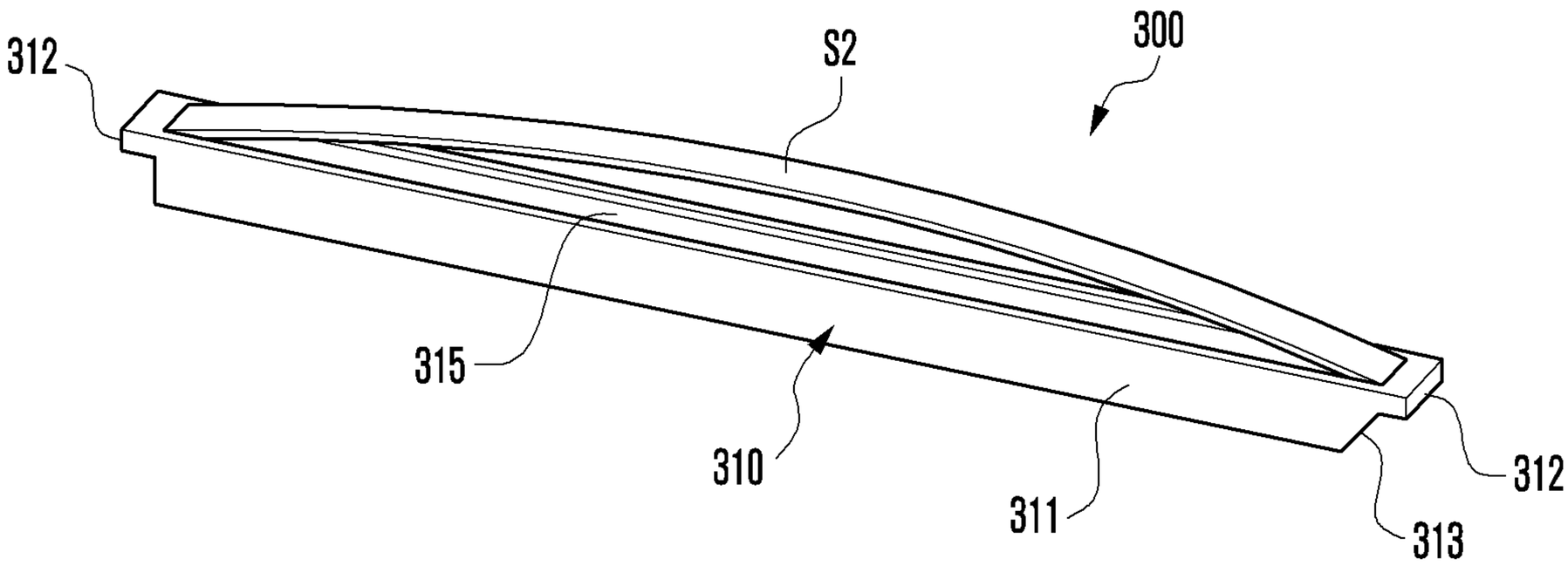
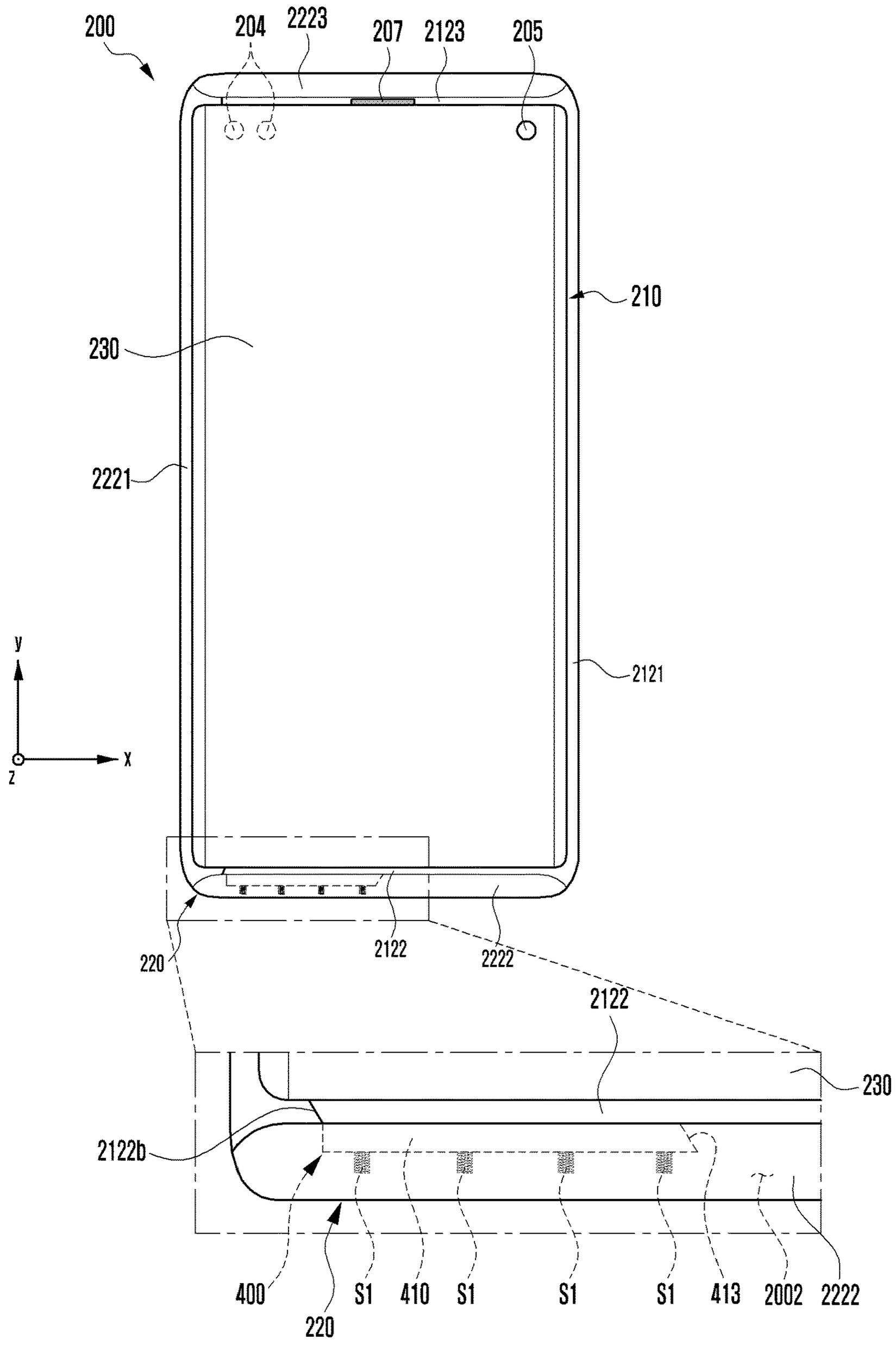


FIG. 12A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2122b
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S1
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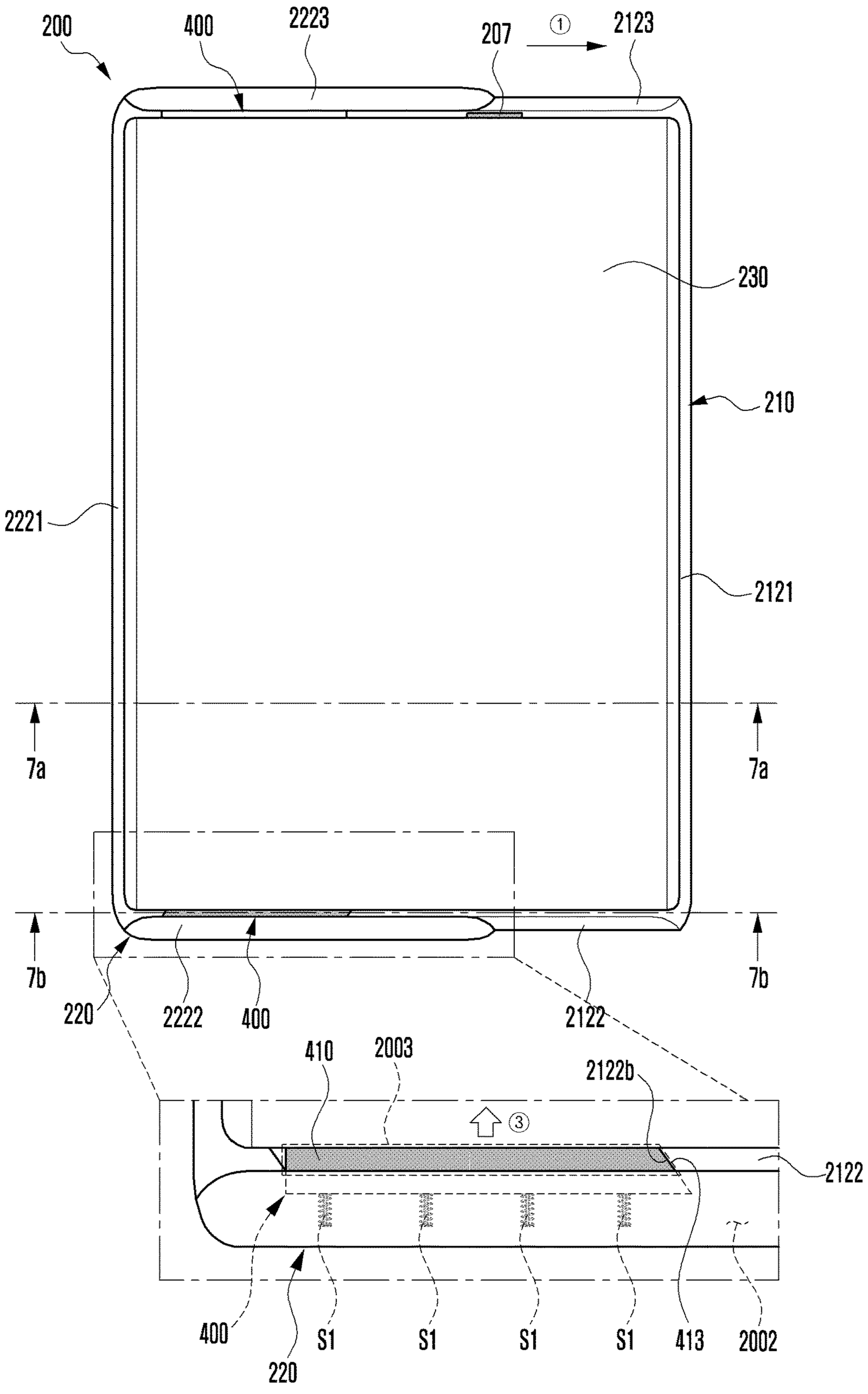
S1
S1
S1
413
2002
2222

FIG. 12B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7b
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S1
S1
S1
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413
2002

FIG. 13A

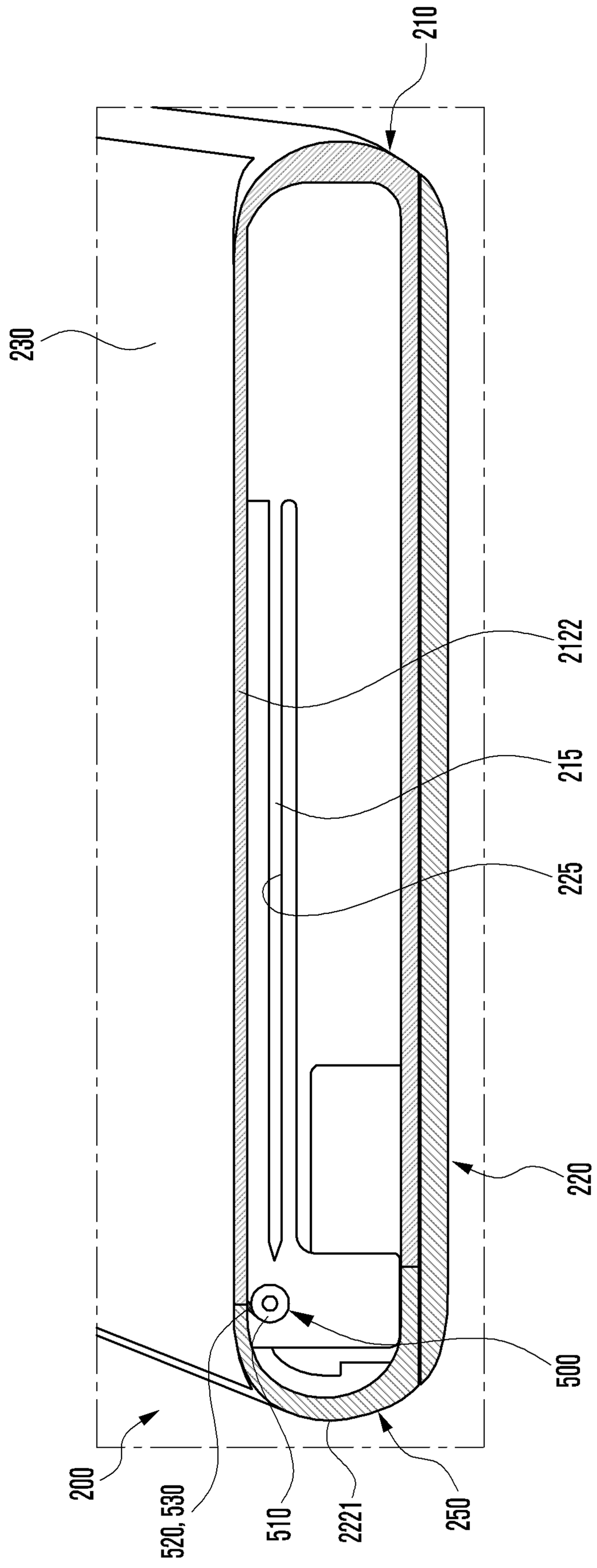


FIG. 13B

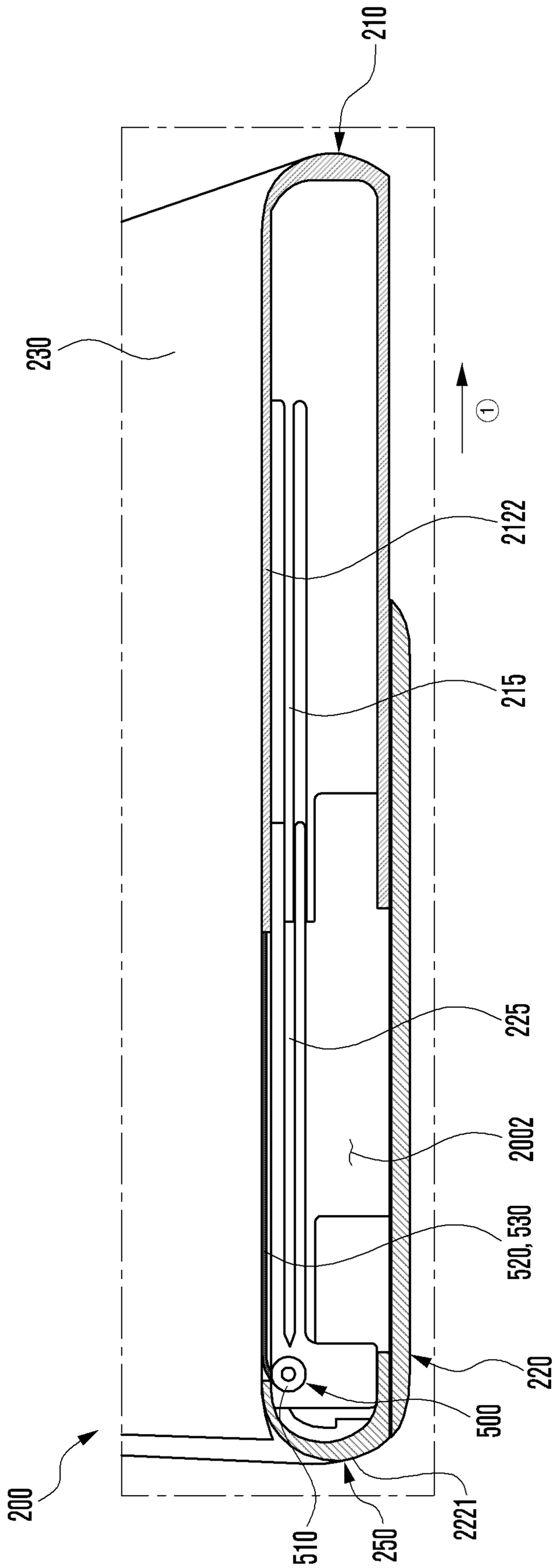


FIG. 14A

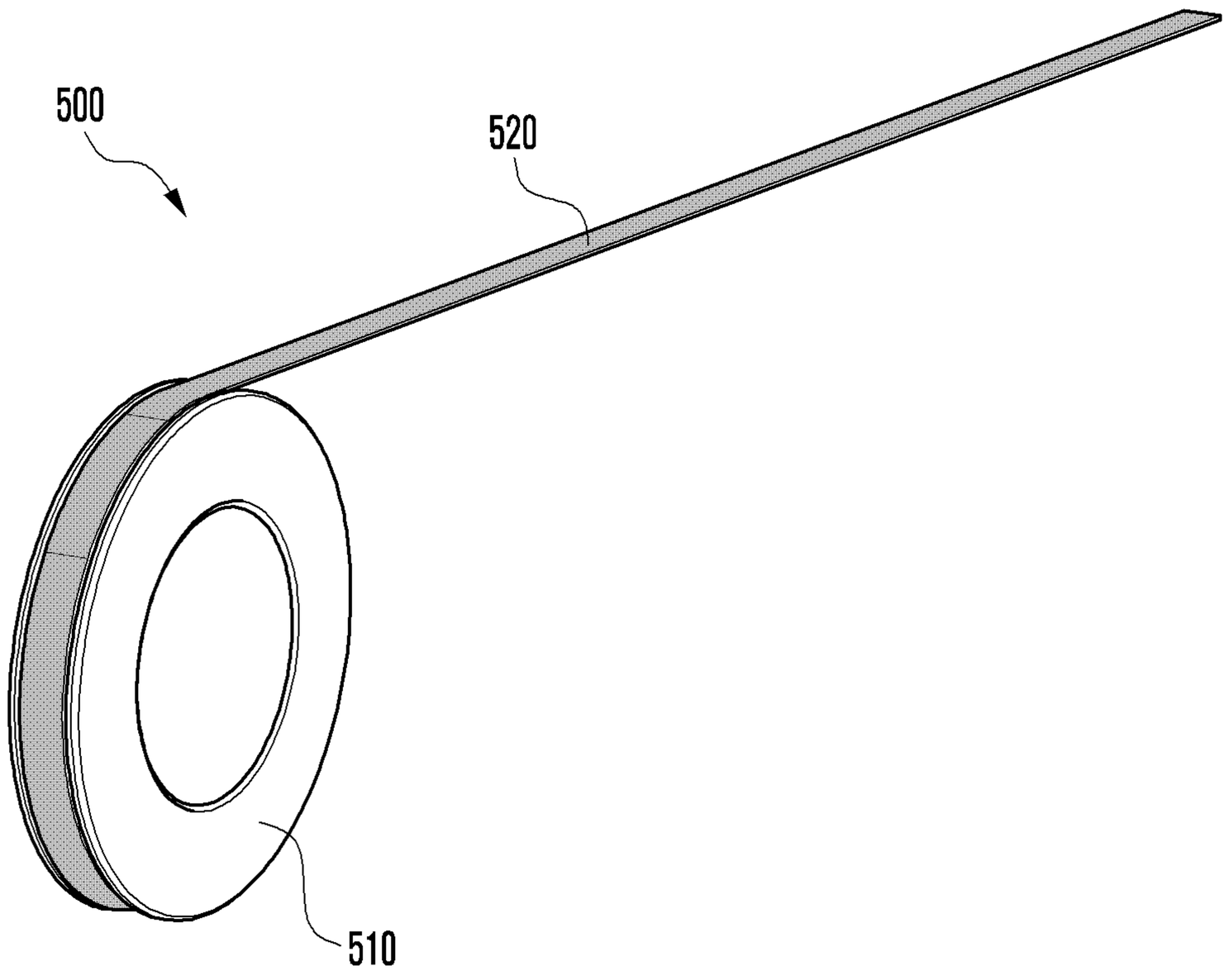


FIG. 14B

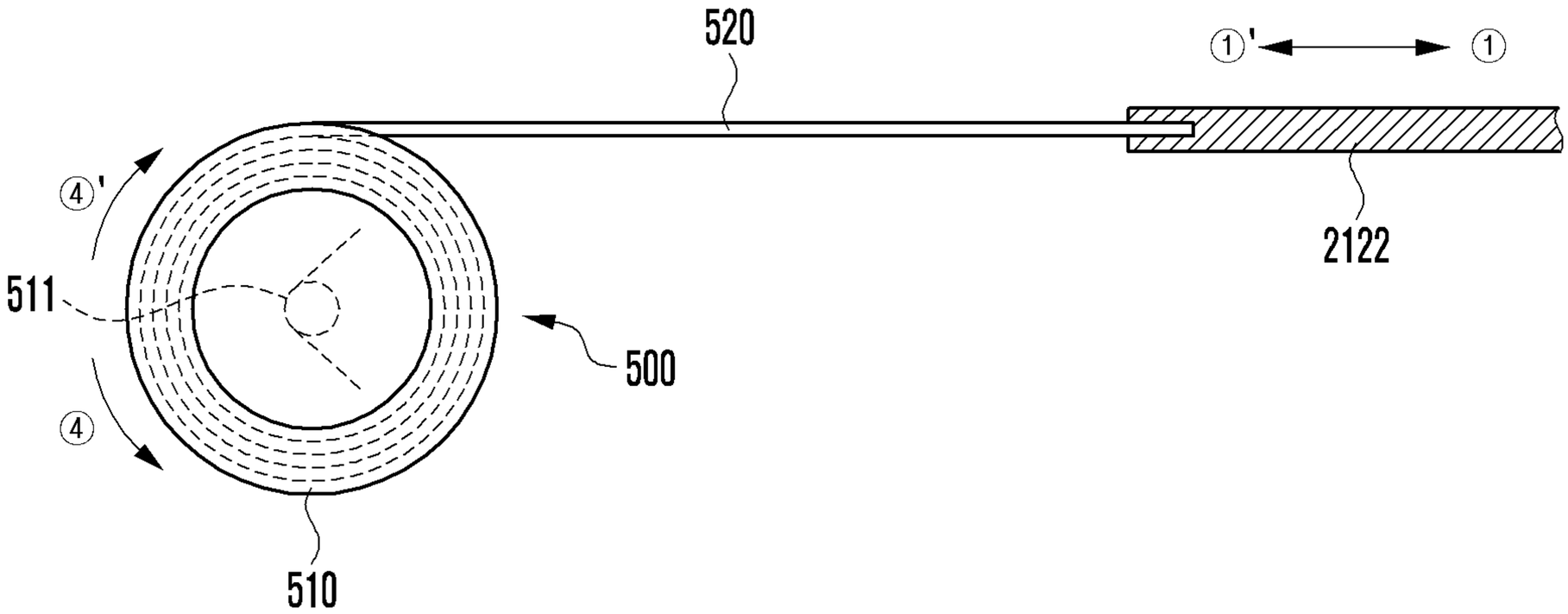


FIG. 15A

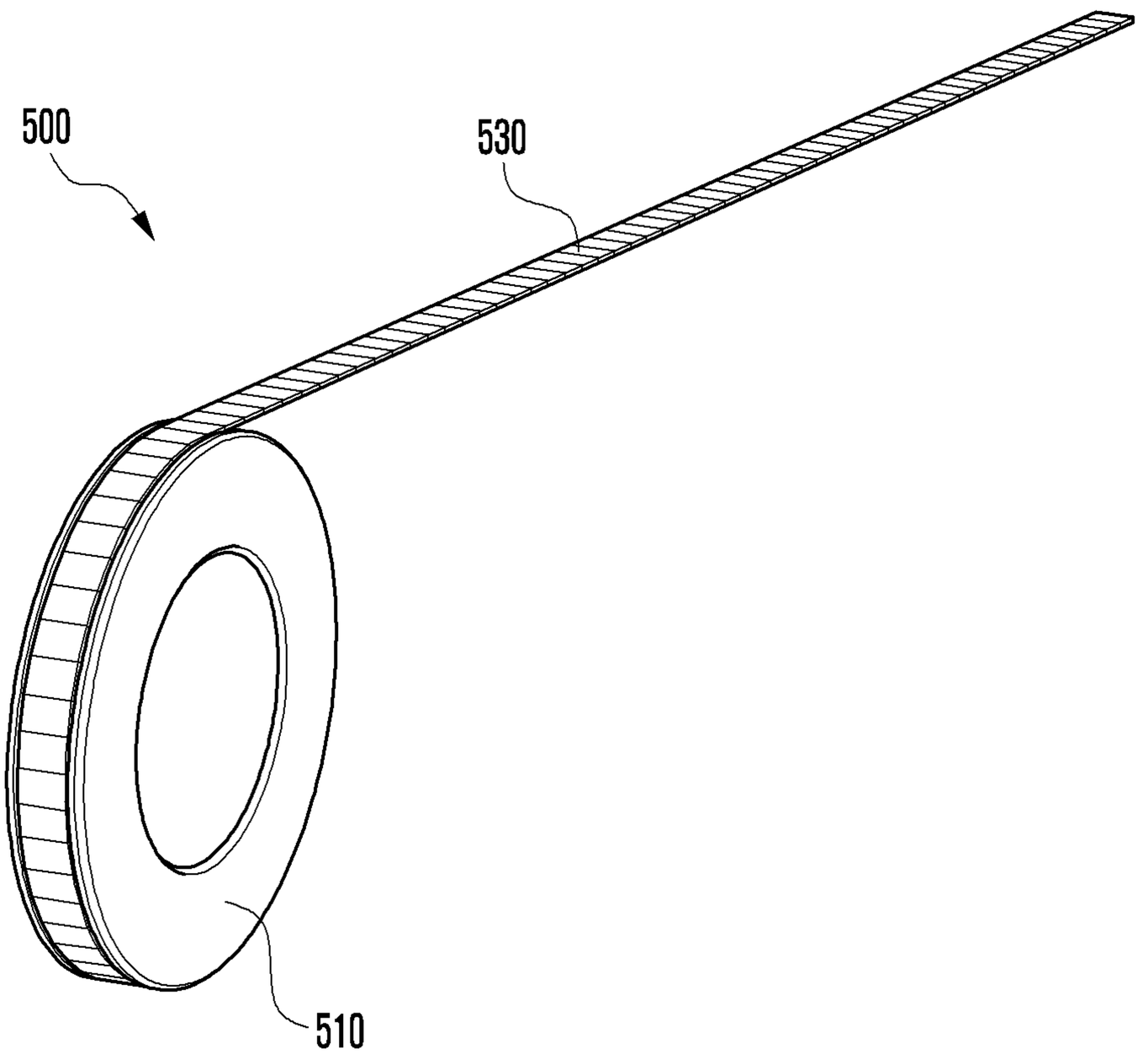


FIG. 15B

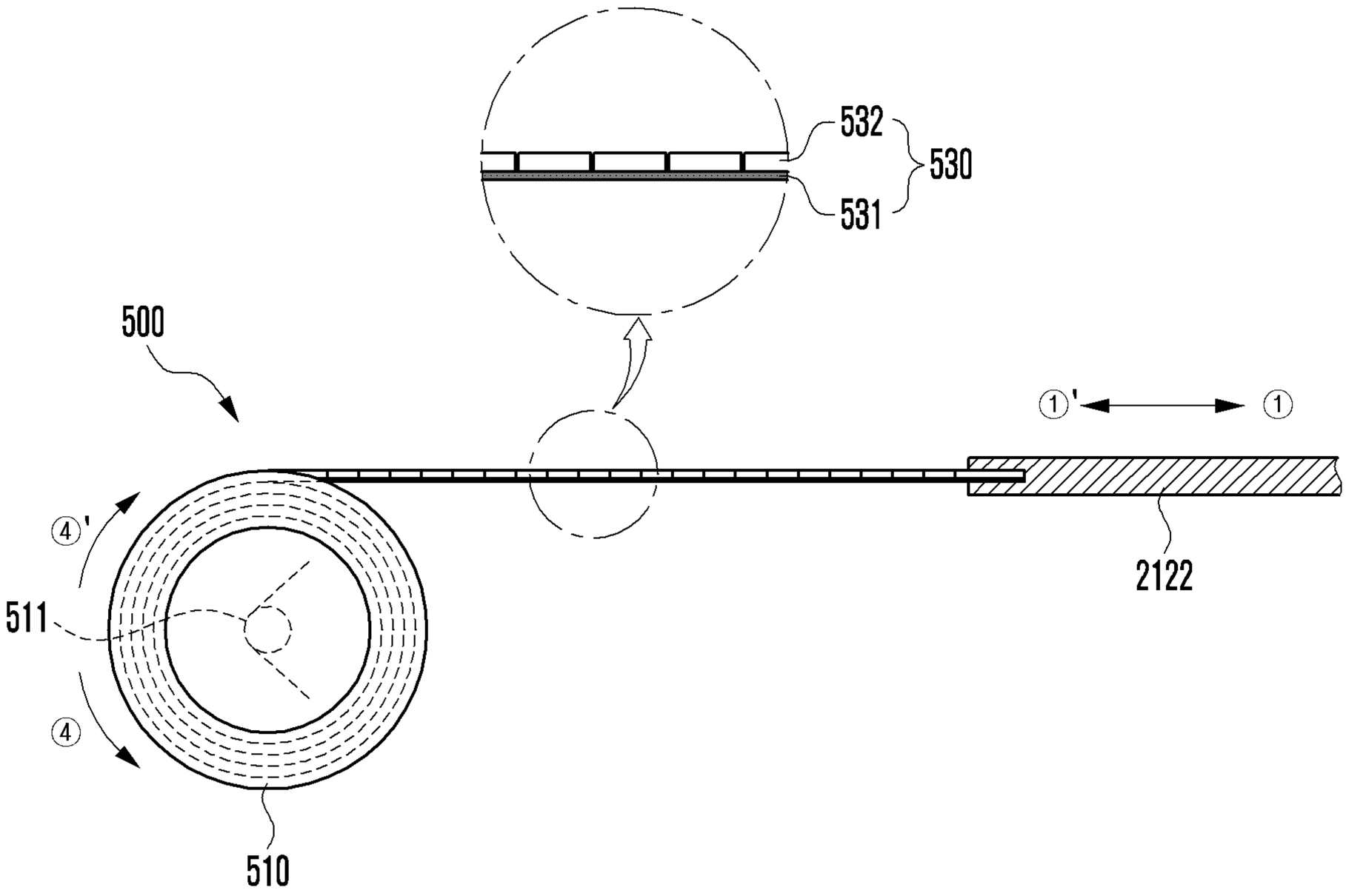


FIG. 16A

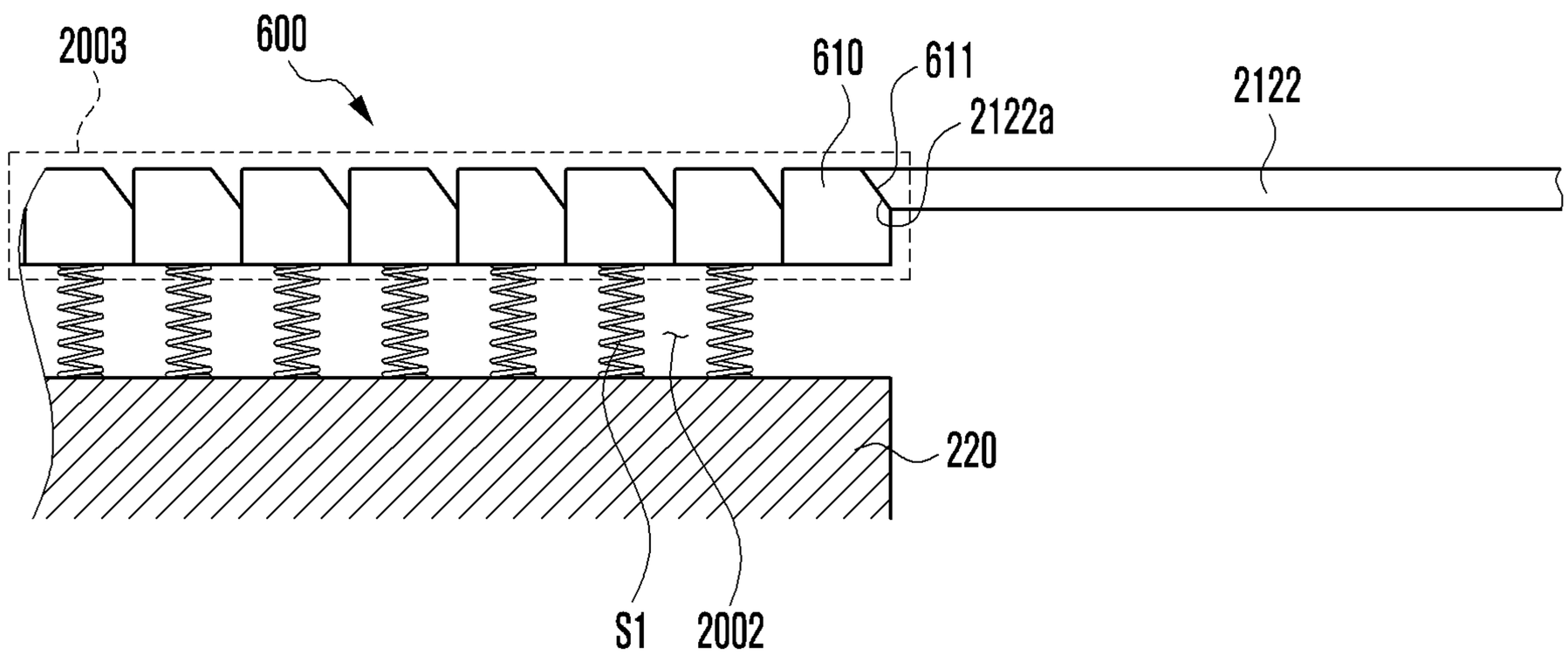
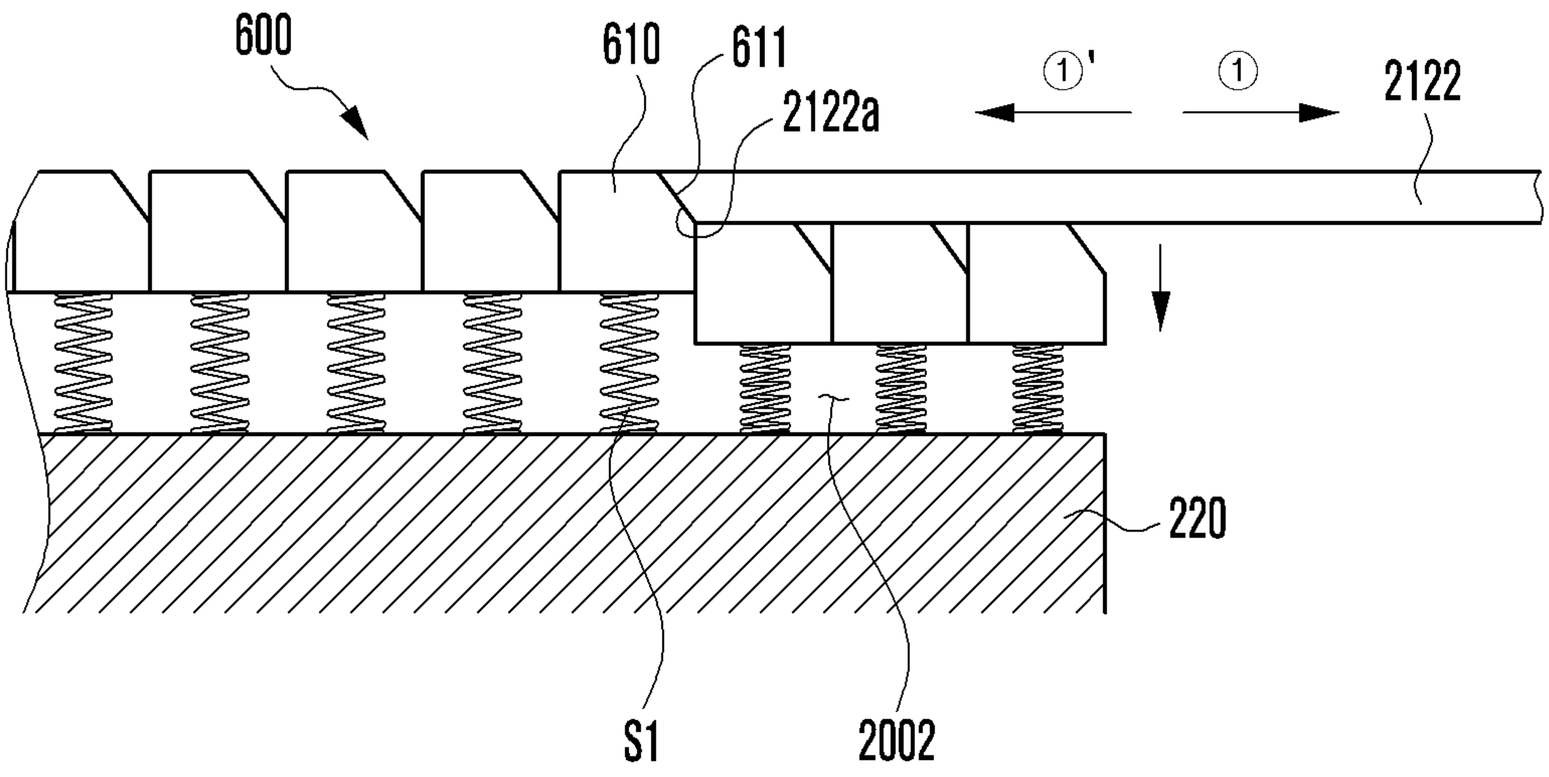


FIG. 16B



ROLLABLE ELECTRONIC DEVICE INCLUDING CLEARANCE COMPENSATION STRUCTURE

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is based on and claims priority under 35 U.S.C. § 119 of a Korean patent application number 10-2019-0167775, filed on Dec. 16, 2019, in the Korean Intellectual Property Office, the disclosure of which is incorporated by reference herein its entirety.

BACKGROUND

1) Field

Certain embodiments relate to a rollable electronic device including a gap compensation structure.

2) Description of Related Art

While electronic devices having increasing numbers of functions, the display is generally limited to uniform rectangular shape that is generally about the size of a palm. However, increasing the size of the display can result in a larger electronic device that has less portability. For example, while the display can be made larger, this results in an electronic device with larger dimensions. With larger dimensions, the user may have difficulty, for example, carrying the electronic device in their pocket.

The above information is presented as background information only to assist with an understanding of the disclosure. No determination has been made, and no assertion is made, as to whether any of the above might be applicable as prior art with regard to the disclosure.

SUMMARY

According to certain embodiments, an electronic device comprises a first housing comprising a first plate having a first surface and a second surface facing away from the first surface, and a first side frame forming a first space and at least partially surrounding the first plate; and a second housing comprising a second plate comprising a third surface facing a same direction as the first surface and a fourth surface facing away from the third surface, and a second side frame forming a second space and at least partially surrounding the second plate, wherein at least a portion of the first side frame of the first housing is coupled to at least a portion of the second side frame to be slidable in a first direction, and the first housing movable between a slide-out state and a slide-in state relative to the second housing; a flexible display comprising: a first portion extending across at least a portion of the third surface; and a second portion extending from the first portion and located in the first space in the slide-in state of the first housing, wherein, when the first housing is switched from the slide-in state to the slide-out state, at least a portion of the second portion is exposed to an outside so as to form a substantially same plane as the first portion; and a clearance compensation structure disposed in the second space and configured to at least partially cover a clearance space generated between the second side frame and the flexible display when the first housing is switched from the slide-in state to the slide-out state.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which like reference numerals represent like parts:

FIG. **1** is a block diagram of an electronic device according to certain embodiments in a network environment;

FIG. **2**A is a perspective view illustrating the front side of an electronic device according to certain embodiments in the slide-in state, and FIG. **2**B is a perspective view illustrating the front side of the electronic device according to certain embodiments in the slide-out state;

FIG. **3**A is a perspective view illustrating the rear side of the electronic device according to certain embodiments in the slide-in state, and FIG. **3**B is a perspective view illustrating the rear side of the electronic device according to certain embodiments in the slide-out state;

FIG. **4**A is an exploded perspective view illustrating the electronic device according to certain embodiments;

FIG. **4**B is a view illustrating the electronic device of FIG. **4**A in a partially coupled state;

FIG. **5**A is a plan view illustrating the electronic device according to certain embodiments in the slide-in state, and FIG. **5**B is a plan view illustrating the electronic device according to certain embodiments in the slide-out state;

FIG. **6**A is a cross-sectional view of the electronic device taken along line **6**A-**6**A in FIG. **5**A;

FIG. **6**B is a cross-sectional view of the electronic device taken along line **6**B-**6**B in FIG. **5**A;

FIG. **7**A is a cross-sectional view of the electronic device taken along line **7**A-**7**A in FIG. **5**B;

FIG. **7**B is a cross-sectional view of the electronic device taken along line **7**B-**7**B in FIG. **5**B;

FIG. **8**A is a perspective view illustrating the front side of the clearance compensation structure of FIG. **5**B, and FIG. **8**B is a perspective view illustrating the rear side of the clearance compensation structure of FIG. **5**B;

FIG. **9** is a view illustrating the operation of the clearance compensation structure of FIG. **5**B;

FIG. **10**A is a cross-sectional view illustrating the electronic device including a clearance compensation structure according to certain embodiments in the slide-in state, and FIG. **10**B is a cross-sectional view illustrating the electronic device including the clearance compensation structure according to certain embodiments in the slide-out state;

FIG. **11**A is a perspective view illustrating the front side of the clearance compensation structure of FIG. **10**A, and FIG. **11**B is a perspective view illustrating the rear side of the clearance compensation structure of FIG. **10**A;

FIG. **12**A is a view illustrating the configuration of the electronic device including a clearance compensation structure according to certain embodiments in the slide-in state, and FIG. **12**B is a view illustrating the configuration of the electronic device including the clearance compensation structure according to certain embodiments in the slide-out state;

FIG. **13**A is a view illustrating, in a partially cross-sectional view, the configuration of an electronic device including a clearance compensation structure according to certain embodiments in the slide-in state, and FIG. **13**B is a view illustrating, in a partially cross-sectional view, the configuration of the electronic device including the clearance compensation structure according to certain embodiments in the slide-out state;

FIG. **14**A is a perspective view illustrating the clearance compensation structure of FIG. **13**A;

FIG. **14**B is a view illustrating the operation state of the clearance compensation structure of FIG. **14**A according to the opening/closing operation of the electronic device according to certain embodiments;

FIG. **15**A is a perspective view illustrating the clearance compensation structure of FIG. **13**A;

FIG. **15**B is a view illustrating the operation state of the clearance compensation structure of FIG. **15**A according to the opening/closing operation of the electronic device according to certain embodiments; and

FIG. **16**A is a view illustrating the configuration of a clearance compensation structure operating in cooperation with the opening/closing operation of the electronic device according to certain embodiments, and FIG. **16**B is a view illustrating the configuration of a clearance compensation structure operating in cooperation with the opening/closing operation of the electronic device according to certain embodiments.

DETAILED DESCRIPTION

Electronic devices may include a deformable and rollable type electronic device (hereinafter, referred to as a "rollable electronic device") in which a display area is expandable (e.g., a sliding-type electronic device or a rolling-type electronic device). The foregoing allows the user to enjoy a larger screen when stationary. However, when the user ports the electronic device, the user can reduce the dimensions, thereby causing the electronic device to, for example, fit in their pocket.

The rollable electronic device may include a first housing and a second housing that can be coupled to each other to be movable relative to each other by being at least partially fitted together. For example, the electronic device may include a first housing coupled so as to at least partially protrude from the second housing in an slide-out state. When including an internal driving mechanism, the electronic device may be automatically switched between the slide-out state and the slide-in state.

The rollable electronic device may include a flexible display the area of which is variable depending on whether the electronic device is in the slide-out state or in the slide-in state. For example, the rollable electronic device may operate to have a display area of a first size in the slide-in state (closed state) and a display area of a second size in the slide-out state (opened state), in which the second size is larger than the first size. When the rollable electronic device is in the slide-out state, the two housings coupled to be at least partially fitted together are deformed to be spaced apart from each other.

To allow one housing to slide-in/slide out of the other housing, one housing may be thinner than the other. Accordingly, when the rollable electronic device is in the slide out state, there may be a clearance (e.g., a gap or a space) between one of the housings and a flexible display. Foreign matter may enter the inside of the rollable electronic device through the clearance and may cause a malfunction.

Certain embodiments are able to provide a rollable electronic device including a clearance compensation structure.

Certain embodiments are able to provide a rollable electronic device including a clearance compensation structure capable of preventing inflow of external foreign matter by compensating for a clearance generated according to the opening operation of the housing.

Certain embodiments are able to provide a rollable electronic device including a clearance compensation structure capable of helping to secure reliability of the device by preventing a malfunction by blocking the inflow of foreign matter due to the opening and closing operation of the housing.

FIG. **1** will describes the various functional modules of the electronic device. FIGS. **2**A-**16**B describe the housing of certain embodiments of the electronic device.

Electronic Device

FIG. **1** illustrates an electronic device in a network environment according to an embodiment of the disclosure.

Referring to FIG. **1**, an electronic device **101** in a network environment **100** may communicate with an electronic device **102** via a first network **198** (e.g., a short-range wireless communication network), or an electronic device **104** or a server **108** via a second network **199** (e.g., a long-range wireless communication network). The electronic device **101** may communicate with the electronic device **104** via the server **108**. The electronic device **101** includes a processor **120**, memory **130**, an input device **150**, an audio output device **155**, a display device **160**, an audio module **170**, a sensor module **176**, an interface **177**, a haptic module **179**, a camera module **180**, a power management module **188**, a battery **189**, a communication module **190**, a subscriber identity module (SIM) **196**, or an antenna module **197**. In some embodiments, at least one (e.g., the display device **160** or the camera module **180**) of the components may be omitted from the electronic device **101**, or one or more other components may be added in the electronic device **101**. In some embodiments, some of the components may be implemented as single integrated circuitry. For example, the sensor module **176** (e.g., a fingerprint sensor, an iris sensor, or an illuminance sensor) may be implemented as embedded in the display device **160** (e.g., a display).

The processor **120** may execute, for example, software (e.g., a program **140**) to control at least one other component (e.g., a hardware or software component) of the electronic device **101** coupled with the processor **120**, and may perform various data processing or computation. As at least part of the data processing or computation, the processor **120** may load a command or data received from another component (e.g., the sensor module **176** or the communication module **190**) in volatile memory **132**, process the command or the data stored in the volatile memory **132**, and store resulting data in non-volatile memory **134**. The processor **120** may include a main processor **121** (e.g., a central processing unit (CPU) or an application processor (AP)), and an auxiliary processor **123** (e.g., a graphics processing unit (GPU), an image signal processor (ISP), a sensor hub processor, or a communication processor (CP)) that is operable independently from, or in conjunction with, the main processor **121**. Additionally or alternatively, the auxiliary processor **123** may be adapted to consume less power than the main processor **121**, or to be specific to a specified function. The auxiliary processor **123** may be implemented as separate from, or as part of the main processor **121**.

The auxiliary processor **123** may control at least some of functions or states related to at least one component (e.g., the display device **160**, the sensor module **176**, or the communication module **190**) among the components of the electronic device **101**, instead of the main processor **121** while the main processor **121** is in an inactive (e.g., sleep) state, or together with the main processor **121** while the main processor **121** is in an active state (e.g., executing an application). The auxiliary processor **123** (e.g., an ISP or a CP) may

be implemented as part of another component (e.g., the camera module **180** or the communication module **190**) functionally related to the auxiliary processor **123**.

The memory **130** may store various data used by at least one component (e.g., the processor **120** or the sensor module **176**) of the electronic device **101**. The various data may include, for example, software (e.g., the program **140**) and input data or output data for a command related thereto. The memory **130** may include the volatile memory **132** or the non-volatile memory **134**. The non-volatile memory **134** may include an internal memory **136** or external memory **138**.

The program **140** may be stored in the memory **130** as software, and may include, for example, an operating system (OS) **142**, middleware **144**, or an application **146**.

The input device **150** may receive a command or data to be used by other component (e.g., the processor **120**) of the electronic device **101**, from the outside (e.g., a user) of the electronic device **101**. The input device **150** may include, for example, a microphone, a mouse, a keyboard, or a digital pen (e.g., a stylus pen).

The audio output device **155** may output sound signals to the outside of the electronic device **101**. The audio output device **155** may include, for example, a speaker or a receiver. The speaker may be used for general purposes, such as playing multimedia or playing record, and the receiver may be used for an incoming calls. The receiver may be implemented as separate from, or as part of the speaker.

The display device **160** may visually provide information to the outside (e.g., a user) of the electronic device **101**. The display device **160** may include, for example, a display, a hologram device, or a projector and control circuitry to control a corresponding one of the display, hologram device, and projector. The display device **160** may include touch circuitry adapted to detect a touch, or sensor circuitry (e.g., a pressure sensor) adapted to measure the intensity of force incurred by the touch.

The audio module **170** may convert a sound into an electrical signal and vice versa. The audio module **170** may obtain the sound via the input device **150**, or output the sound via the audio output device **155** or a headphone of an external electronic device (e.g., an electronic device **102**) directly (e.g., wiredly) or wirelessly coupled with the electronic device **101**.

The sensor module **176** may detect an operational state (e.g., power or temperature) of the electronic device **101** or an environmental state (e.g., a state of a user) external to the electronic device **101**, and then generate an electrical signal or data value corresponding to the detected state. The sensor module **176** may include, for example, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a proximity sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, a humidity sensor, or an illuminance sensor.

The interface **177** may support one or more specified protocols to be used for the electronic device **101** to be coupled with the external electronic device (e.g., the electronic device **102**) directly (e.g., wiredly) or wirelessly. The interface **177** may include, for example, a high definition multimedia interface (HDMI), a universal serial bus (USB) interface, a secure digital (SD) card interface, or an audio interface.

A connection terminal **178** may include a connector via which the electronic device **101** may be physically connected with the external electronic device (e.g., the electronic device **102**). The connection terminal **178** may include, for example, a HDMI connector, a USB connector, a SD card connector, or an audio connector (e.g., a headphone connector).

The haptic module **179** may convert an electrical signal into a mechanical stimulus (e.g., a vibration or a movement) or electrical stimulus which may be recognized by a user via his tactile sensation or kinesthetic sensation. The haptic module **179** may include, for example, a motor, a piezoelectric element, or an electric stimulator.

The camera module **180** may capture a still image or moving images. The camera module **180** may include one or more lenses, image sensors, image signal processors, or flashes.

The power management module **188** may manage power supplied to the electronic device **101**. The power management module **188** may be implemented as at least part of, for example, a power management integrated circuit (PMIC).

The battery **189** may supply power to at least one component of the electronic device **101**. The battery **189** may include, for example, a primary cell which is not rechargeable, a secondary cell which is rechargeable, or a fuel cell.

The communication module **190** may support establishing a direct (e.g., wired) communication channel or a wireless communication channel between the electronic device **101** and the external electronic device (e.g., the electronic device **102**, the electronic device **104**, or the server **108**) and performing communication via the established communication channel. The communication module **190** may include one or more communication processors that are operable independently from the processor **120** (e.g., the AP) and supports a direct (e.g., wired) communication or a wireless communication. The communication module **190** may include a wireless communication module **192** (e.g., a cellular communication module, a short-range wireless communication module, or a global navigation satellite system (GNSS) communication module) or a wired communication module **194** (e.g., a local area network (LAN) communication module or a power line communication (PLC) module). A corresponding one of these communication modules may communicate with the external electronic device via the first network **198** (e.g., a short-range communication network, such as Bluetooth™, wireless-fidelity (Wi-Fi) direct, or a standard of the Infrared Data Association (IrDA)) or the second network **199** (e.g., a long-range communication network, such as a cellular network, the Internet, or a computer network (e.g., LAN or wide area network (WAN)). These various types of communication modules may be implemented as a single component (e.g., a single chip), or may be implemented as multi components (e.g., multi chips) separate from each other. The wireless communication module **192** may identify and authenticate the electronic device **101** in a communication network, such as the first network **198** or the second network **199**, using subscriber information (e.g., international mobile subscriber identity (IMSI)) stored in the SIM **196**.

The antenna module **197** may transmit or receive a signal or power to or from the outside (e.g., the external electronic device) of the electronic device **101**. The antenna module **197** may include an antenna including a radiating element composed of a conductive material or a conductive pattern formed in or on a substrate (e.g., a PCB). The antenna module **197** may include a plurality of antennas. In such a case, at least one antenna appropriate for a communication scheme used in the communication network, such as the first network **198** or the second network **199**, may be selected, for example, by the communication module **190** (e.g., the

wireless communication module **192**) from the plurality of antennas. The signal or the power may then be transmitted or received between the communication module **190** and the external electronic device via the selected at least one antenna. Another component (e.g., a radio frequency integrated circuit (RFIC)) other than the radiating element may be additionally formed as part of the antenna module **197**.

At least some of the above-described components may be coupled mutually and communicate signals (e.g., commands or data) therebetween via an inter-peripheral communication scheme (e.g., a bus, general purpose input and output (GPIO), serial peripheral interface (SPI), or mobile industry processor interface (MIPI)).

Commands or data may be transmitted or received between the electronic device **101** and the external electronic device **104** via the server **108** coupled with the second network **199**. Each of the electronic devices **102** and **104** may be a device of a same type as, or a different type, from the electronic device **101**. All or some of operations to be executed at the electronic device **101** may be executed at one or more of the external electronic devices **102**, **104**, or **108**. For example, if the electronic device **101** should perform a function or a service automatically, or in response to a request from a user or another device, the electronic device **101**, instead of, or in addition to, executing the function or the service, may request the one or more external electronic devices to perform at least part of the function or the service. The one or more external electronic devices receiving the request may perform the at least part of the function or the service requested, or an additional function or an additional service related to the request, and transfer an outcome of the performing to the electronic device **101**. The electronic device **101** may provide the outcome, with or without further processing of the outcome, as at least part of a reply to the request. To that end, a cloud computing, distributed computing, or client-server computing technology may be used, for example.

An electronic device according to an embodiment may be one of various types of electronic devices. The electronic device may include a portable communication device (e.g., a smart phone), a computer device, a portable multimedia device, a portable medical device, a camera, a wearable device, or a home appliance. However, the electronic device is not limited to any of those described above.

Certain embodiments of the disclosure and the terms used herein are not intended to limit the technological features set forth herein to particular embodiments and include various changes, equivalents, or replacements for a corresponding embodiment.

With regard to the description of the drawings, similar reference numerals may be used to refer to similar or related elements.

A singular form of a noun corresponding to an item may include one or more of the things, unless the relevant context clearly indicates otherwise. As used herein, each of such phrases as "A or B", "at least one of A and B", "at least one of A or B", "A, B, or C", "at least one of A, B, and C", and "at least one of A, B, or C" may include any one of, or all possible combinations of the items enumerated together in a corresponding one of the phrases.

As used herein, such terms as "1st" and "2nd", or "first" and "second" may be used to simply distinguish a corresponding component from another, and does not limit the components in other aspect (e.g., importance or order). If an element (e.g., a first element) is referred to, with or without the term "operatively" or "communicatively", as "coupled with", "coupled to", "connected with", or "connected to" another element (e.g., a second element), it means that the element may be coupled with the other element directly (e.g., wiredly), wirelessly, or via a third element.

The term "module" may include a unit implemented in hardware, software, or firmware, and may interchangeably be used with other terms, for example, "logic", "logic block", "part", or "circuitry". A module may be a single integral component, or a minimum unit or part thereof, adapted to perform one or more functions. For example, according to an embodiment, the module may be implemented in a form of an application-specific integrated circuit (ASIC).

Certain embodiments as set forth herein may be implemented as software (e.g., the program **140**) including one or more instructions that are stored in a storage medium (e.g., internal memory **136** or external memory **138**) that is readable by a machine (e.g., the electronic device **101**). For example, a processor (e.g., the processor **120**) of the machine (e.g., the electronic device **101**) may invoke at least one of the one or more instructions stored in the storage medium, and execute it, with or without using one or more other components under the control of the processor. This allows the machine to be operated to perform at least one function according to the at least one instruction invoked. The one or more instructions may include a code generated by a complier or a code executable by an interpreter. The machine-readable storage medium may be provided in the form of a non-transitory storage medium. Wherein, the term "non-transitory" simply means that the storage medium is a tangible device, and does not include a signal (e.g., an electromagnetic wave), but this term does not differentiate between where data is semi-permanently stored in the storage medium and where the data is temporarily stored in the storage medium.

A method according to an embodiment of the disclosure may be included and provided in a computer program product. The computer program product may be traded as a product between a seller and a buyer. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)), or be distributed (e.g., downloaded or uploaded) online via an application store (e.g., PlayStore™), or between two user devices (e.g., smart phones) directly. If distributed online, at least part of the computer program product may be temporarily generated or at least temporarily stored in the machine-readable storage medium, such as memory of the manufacturer's server, a server of the application store, or a relay server.

Each component (e.g., a module or a program) of the above-described components may include a single entity or multiple entities. One or more of the above-described components may be omitted, or one or more other components may be added. Alternatively or additionally, a plurality of components (e.g., modules or programs) may be integrated into a single component. In such a case, the integrated component may still perform one or more functions of each of the plurality of components in the same or similar manner as they are performed by a corresponding one of the plurality of components before the integration. Operations performed by the module, the program, or another component may be carried out sequentially, in parallel, repeatedly, or heuristically, or one or more of the operations may be executed in a different order or omitted, or one or more other operations may be added.

While electronic devices having increasing numbers of functions, a dilemma can occur with the display **160**. A small display **160** can cause a displeasing user experience, while

a large display **160** can increase the dimensions of the electronic device **101**, thereby reducing the portability of the electronic device **101**.

To alleviate this, FIGS. **2**A-**3**B illustrate a deformable and rollable type electronic device **200** (hereinafter, referred to as a "rollable electronic device") in which a display area is expandable (e.g., a sliding-type electronic device or a rolling-type electronic device). The electronic device **200** includes a first housing **210** and a second housing **220**. The first housing **210** can be slide out of the second housing **220** (see FIG. **2**B, **3**B), thereby increasing the display **230** size when the user is stationary. However, when the user ports the electronic device **200**, the user can slide the first housing **210** into the second housing **220**. Sliding the first housing **210** into the second housing **220** reduces the dimensions of the electronic device **200**.

FIG. **2**A is a perspective view illustrating the front side of an electronic device **200** according to certain embodiments in the slide-in state, and FIG. **2**B is a perspective view illustrating the front side of the electronic device **200** according to certain embodiments in the slide-out state. FIG. **3**A is a perspective view illustrating the front side of an electronic device **200** according to certain embodiments in the slide-in state, and FIG. **3**B is a perspective view illustrating the front side of the electronic device **200** according to certain embodiments in the slide-out state.

The electronic device **200** of FIG. **2**A may be at least partially similar to the electronic device **101** of FIG. **1** or may further include other embodiments of an electronic device.

Housing

Referring to FIGS. **2**A to **3**B, the electronic device **200** may include a first housing **210** and a second housing **220**. The second housing **220** is coupled to the first housing **210**, so that the first housing **210** is at least partially movable with respect to the second housing **220**. According to an embodiment, the first housing **210** may include a first plate **211** and a first side frame **212**. The first plate **211** and the first side frame **212** can extend in a substantially vertical direction (e.g., the z-axis direction) along the periphery of the first plate **211**. The first side frame **212** may include a first side surface **2121**, a second side surface **2122** extending from one end of the first side surface **2121**, and a third side face **2123** extending from the other end of the first side face **2121**. The first housing **210** may include a first space (e.g., the first space **2001** in FIG. **4**A) which is at least partially closed from the outside by the first plate **211** and the first side frame **212**.

According to certain embodiments, the second housing **220** may include a second plate **221** and a second side frame **222**. The second plate **221** and the second side frame **222** can extend in a substantially vertical direction (e.g., the z-axis direction) along the periphery of the second plate **221**. The second side frame **222** may include a fourth side surface **221** facing away from the first side surface **2121**, a fifth side surface extending from one end of the fourth side surface and at least partially coupled to the second side surface **2122**, and a sixth side surface **2223** extending from the other end of the fourth side surface **2221** and at least partially coupled to the third side surface **2123**. In another embodiment, the fourth side surface **2221** may extend from a structure (e.g., the second guide plate **250** in FIG. **4**A) other than the second plate **221** and may be coupled to the second plate **221**.

The second housing **220** may include a second space (e.g., the second space **2002** in FIG. **4**A) which is at least partially closed from the outside by the second plate **221** and the second side frame **222**. According to an embodiment, the first plate **211** and the second plate **221** may be arranged so as to form at least partially the rear surface of the electronic device **200**. The first plate **211**, the second plate **221**, the first side frame **212**, and the second side frame **222** may be formed of, for example, a polymer, coated or colored glass, ceramic, metal (e.g., aluminum, stainless steel (STS), or magnesium), or a combination of two or more of these materials.

Flexible Display

According to certain embodiments, the electronic device **200** may include a flexible display **230** disposed to be supported by the first housing **210** and the second housing **220**. The flexible display **230** may include a first portion **231** (e.g., a flat portion) and a second portion **232** (e.g., a bendable portion). The first portion (e.g., the first portion **231** in FIG. **4**A) can be supported by the second housing **220**. The second portion (e.g., the second portion **232** in FIG. **4**A) can be extending from the first portion **231** and supported by the first housing **210**. The second portion **232** of the flexible display **230** may be disposed in a first space (e.g., the first space **2001** in FIG. **4**A) of the first housing **210** to prevent exposure to the outside when the electronic device **200** is closed (slide-in state), and may be exposed to the outside to extend from the first portion **231** while being supported by the first housing **210** when the electronic device **200** is opened (slide-out state)(e.g., opened state). Accordingly, the electronic device **200** may be a rollable electronic device in which the display screen of the flexible display **230** is expanded according to an open operation according to the movement of the first housing **210** from the second housing **200**.

The flexible display **230** is configured to only display on the first portion **231** when the device is in the slide-in state, and display on the first portion **231** and the second portion **232** when the device is in the slide-out state. Thus, the active area of the flexible display **230** can be varied. In certain embodiments, the active area of the flexible display **230** can be varied based on the amount that the first housing **210** protrudes from the second housing **220**.

Changing Between Open State and Slide-in State

According to certain embodiments, in the electronic device **200**, the first housing **210** may be at least partially inserted into the a second space (e.g., the second space **2002** in FIG. **4**A) of the second housing **220**, and may be coupled to be movable in the illustrated direction ①. For example, in the slide-in state, the electronic device **200** is maintained in the state in which the first housing **210** and the second housing **220** are coupled to each such that the first side surface **2121** and the fourth side surface **2221** have a first distance d**1** therebetween. When changed to the slide-out state, the electronic device **200** is maintained in the state in which the first housing **210** protrudes from the second housing **220** such that the first housing **210** protrudes from the second housing **220** by a predetermined distance d**2**. As a result, the first side surface **2121** and the fourth side surface **2221** have a second spacing distance d (or d**1**+d**2**) therebetween. According to an embodiment, the flexible display **230** may be supported by the first housing **210** and/or the second housing **220** such that both ends thereof have curved edges formed in a curved shape in the slide-out state.

According to certain embodiments, the electronic device **200** may be automatically switched between the slide-out state and the slide-in state by a driving unit (e.g., the driving unit **260** in FIG. **4**A) disposed in the first space (e.g., the first space **2001** in FIG. **4**A) and/or the second space (e.g., the second space **2002** in FIG. **4**A). The driving unit **260** can be

motorized. For example, the processor (e.g., the processor **120** of FIG. **1**) of the electronic device **200** may be configured to control the operation of the first housing **210** via the driving unit **260** when detecting an event for switching between the slide-out state and the slide-in state of the electronic device **200**. In another embodiment, the first housing **210** may manually protrude from the second housing **220** through the user's manipulation. In this case, the first housing **210** may protrude with a desired protrusion amount, and due to this, the screen of the flexible display **230** may also be variable so as to have various display areas. Accordingly, the processor (e.g., the processor **120** in FIG. **1**) of the electronic device **200** may perform control such that an object is displayed in various ways and an application is executed in response to the display area corresponding to a predetermined protrusion amount of the first housing **210**.

Input/Output Devices, Sensors, and Antennas

According to certain embodiments, the electronic device **200** may include at least one of an input device **203**, sound output devices **206** and **207**, sensor modules **204** and **217**, camera modules **205** and **216**, a connector port **208**, a key input device (not illustrated), or an indicator (not illustrated). In another embodiment, the electronic device **200** may omit at least one of the above-mentioned components, or may additionally include other components.

According to certain embodiments, the input device **203** may include a microphone **203**. In some embodiments, the input device **203** may include a plurality of microphones **203** arranged to sense the direction of sound. The sound output devices **206** and **207** may include speakers **206** and **207**. The speakers **206** and **207** may include an external speaker **206** and a phone call receiver **207**. In another embodiment, when the external speaker **206'** is disposed in the first housing **210**, in the slide-in state, sound may be output through the speaker hole **206** formed in the second housing **220**. According to an embodiment, the microphone **203** or the connector port **208** may also be formed to have substantially the same configuration. In another embodiment, the sound output devices **206** and **207** may include a speaker (e.g., a piezo speaker) that operates without a separate speaker hole **206**.

According to certain embodiments, the sensor modules **204** and **217** may generate an electrical signal or a data value corresponding to the internal operating state of the electronic device **200** or an external environmental state. The sensor modules **204** and **217** may include, for example, a first sensor module **204** (e.g., a proximity sensor or an illuminance sensor) and/or a second sensor module **217** (e.g., an HRM sensor) disposed on the rear surface of the housing **220**. According to an embodiment, the first sensor module **204** may be disposed below the flexible display **230** in the second housing **220**. According to an embodiment, the first sensor module **204** may further include at least one of a proximity sensor, an illuminance sensor **204**, a time of flight (TOF) sensor, an ultrasonic sensor, a fingerprint recognition sensor, a gesture sensor, a gyro sensor, an atmospheric pressure sensor, a magnetic sensor, an acceleration sensor, a grip sensor, a color sensor, an infrared (IR) sensor, a biometric sensor, a temperature sensor, or a humidity sensor.

According to certain embodiments, the camera devices **205** and **216** may include a first camera device **205** disposed on the front surface of the second housing **220** of the electronic device **200** and a second camera **216** disposed on the rear surface of the second housing **220**. According to an embodiment, the electronic device **200** may include a flash **218** disposed in the vicinity of the second camera **216**. According to an embodiment, the camera devices **205** and **216** may include one or more lenses, an image sensor, and/or an image signal processor. According to an embodiment, the first camera device **205** may be disposed under the flexible display **230**, and may be configured to image an object through a part of the active area of the flexible display **230**. According to an embodiment, the flash **218** may include, for example, a light-emitting diode or a xenon lamp. In some embodiments, two or more lenses (e.g., a wide-angle lens and a telephoto lens) and image sensors may be disposed on one surface of the electronic device **200**.

According to certain embodiments, the electronic device **200** may include at least one antenna (not illustrated). According to an embodiment, the at least one antenna may wirelessly communicate with an external electronic device (e.g., the electronic device **104** in FIG. **1**), or may wirelessly transmit/receive power required for charging. According to an embodiment, the antenna may include a legacy antenna, a mmWave antenna, a nearfield communication (NFC) antenna, a wireless charging antenna, and/or a magnetic secure transmission (MST) antenna. In another embodiment, an antenna structure may be formed through at least a portion of the first side frame **212** and/or the second side frame **222**, which are formed of metal.

Clearance Compensation Structure

When the electronic device **200** is changed to the slide-out state, the first housing **210** moves away from the second housing. As a result, a clearance area or opening can occur between the second side frame and a display. To prevent entry of foreign substances, certain embodiments can include a clearance compensation structure. In certain embodiments, the clearance compensation structure can include a guide block that is retracted when the electronic device **200** is in the slide-in state, and which protrudes or extends to at least partially cover the clearance area when the electronic device **200** is in the slide-out state.

FIG. **4**A is an exploded perspective view illustrating the electronic device **200** according to certain embodiments. FIG. **4**B is a view illustrating the electronic device **200** of FIG. **4**A in a partially coupled state.

Referring to FIGS. **4**A and **4**B, the electronic device **200** may include a first housing **210** and a second housing **220** coupled to the first housing **210** to be at least partially movable. The first housing **210** can include a first guide plate **240** located in the first housing **210**. The second housing **220** can include a second guide plate **250** located in the second housing **220**. A driving unit can be disposed in a first space **2001** between the first housing **210** and the first guide plate **240**. A flexible display **230** can be located to be supported by the first guide plate **240** and the second guide plate **250**. A clearance compensation structure **300** is provided so as to compensate for a clearance (e.g., a clearance space) between the first housing **210** and the second housing **220** in the slide-out state.

According to certain embodiments, the first housing **210** may include a first plate **211** and a first side frame **212** extending in a substantially vertical direction (e.g., the z-axis direction) along the periphery of the first plate **211**. The first side frame **212** may include a first side surface **2121**, a second side surface **2122** extending from one end of the first side surface **2121**, and a third side face **2123** extending from the other end of the first side face **2121**. The first housing **210** may include a first space **2001** at least partially closed from the outside by the first guide plate **240**, the first plate **211**, and the first side frame **212**.

According to certain embodiments, the second housing **220** may include a second plate **221** and a second side frame **222** extending in a substantially vertical direction (e.g., the z-axis direction) along the periphery of the second plate **221**.

The second housing **220** may include a fourth side surface **2221** extending from one end of the second guide plate **250** and facing away from the first side surface **2121**, a fifth side surface **2222** extending from at least a portion of the second plate **221** and at least partially coupled to the second side surface **2122**, and a sixth side surface **2223** extending from at least a portion of the second plate **221** and at least partially coupled to the third side surface **2123**. In another embodiment, the fourth side surface **2221** may be formed to extend from the second plate **221** rather than the second guide plate **250** and to be connected to the fifth side surface **2222** and the sixth side surface **2223**. The first housing **220** may include a second space **2002** at least partially closed from the outside by the second guide plate **250**, the second plate **221**, and second first side frame **222**. The first guide plate **240** and the second guide plate **250** may include a guide structure. The first guide plate **240** may include at least one first guide protrusion **241** protruding to the outside.

The second guide plate **250** may include at least one guide slit **251** formed at a position corresponding to at least one guide protrusion **241**. For example, the first guide plate **240** may be guided in the x-axis direction with respect to the second guide plate **250** since the guide protrusion **241** is inserted into the guide slit **251**. Therefore, the first housing **210** to which the first guide plate **240** is fixed may also be guided in the x-axis direction with respect to the second housing **220** to which the second guide plate **250** is fixed. In another embodiment, the electronic device **200** may have an additional guide structure through an structural change of each of the housings **210** and **220**. For example, in the electronic device **200**, the opening/closing of the first housing **210** may be guided in the manner in which a guide rib (e.g., the guide rib **215** in FIG. **13**A) formed on the inner surface of the second side surface **2122** of the first housing **210** is guided in the x-axis direction along a guide rail (e.g., the guide rail **225** in FIG. **13**A) formed on the inner surface of the fifth side surface **2222** of the housing **220**.

According to an embodiment, the electronic device **200** may include a driving unit **260** fixed in the first space **211** between the first guide plate **240** and the first plate **211**. The driving unit **260** may include at least one driving motor **261** and a pinion gear **262** rotated by receiving the driving force of the driving motor **261**. The pinion gear **262** may mesh with a rack gear (e.g., the rack gear **252** in FIG. **6**A) formed on the bottom surface of the second guide plate **250** when the first housing **210** and the second housing **220** are coupled to be slidable with respect to each other. The first housing **210** is opened/closed in the x-axis direction with respect to the second housing **220** according to the rotation of the pinion gear **262** meshing with the rack gear **252** formed on the second guide plate **250**.

According to certain embodiments, the electronic device **200** may include a flexible display **230** disposed to be supported by the first housing **210** and the second housing **220**. The flexible display **230** may include a first portion **231** supported by the second housing **220** and a second portion **232** extending from the first portion **231** and supported by the first housing **210**. The second portion **232** may be disposed in the first space **2001** of the first housing **210** to prevent exposure to the outside when the electronic device **200** is closed (slide-in state), and may be exposed to the outside to extend from the first portion **231** while being supported by the first housing **210** when the electronic device **200** is opened (slide-out state).

According to certain embodiments, the electronic device **200** may include a clearance compensation structure **300** disposed in the second space **2002**. The clearance compensation structure **300** may include a guide block for compensating for (e.g., blocking, closing, or sealing) a clearance portion between the second housing **220** and the first housing **210** when the electronic device **200** is open (slide-out state), and a plurality of coil springs S**1** for pressing the guide block **310** toward the clearance portion. According to an embodiment, when the electronic device **200** is in the slide-out state, it is possible to prevent foreign matter from flowing into the clearance portion between the first housing **210** and the second housing **220** by the clearance compensation structure **300**.

FIG. **5**A is a plan view illustrating the electronic device **200** according to certain embodiments in the slide-in state, and FIG. **5**B is a perspective view illustrating the electronic device **200** according to certain embodiments in the slide-out state.

Referring to FIGS. **5**A and **5**B, when the electronic device **200** is in the slide-in state, substantially most of the first housing **210** may be introduced into the second space **2002** in the second housing **220**, and may be disposed such that only the first side surface **2121** is exposed to the outside. When the electronic device **200** is in the slide-out state, a portion of the first housing **210** protrudes from the second housing **220** by a predetermined protrusion amount in a first direction (direction ①) through a slide operation.

In this case, a portion of the second side surface **2121** of the first housing **210** and a portion of the third side surface **2221** may also be exposed to the outside. The first housing **210** and the second housing **220** are coupled to be slidable with respect to each other, and may be coupled to each other by being fitted to each other such that, in the slide-in state, the two housings are to be seen as one housing rather than as two housings (in order to make the electronic device slim and to form a beautiful appearance). In the slide-out state, the electronic device **200** may include a clearance (gap) **2003** (FIG. **5**B) generated between the second housing **220** and the first housing **210** spaced apart from the second housing **220**.

The clearance space **2003** occurs because the second side surface **2122** moves away from the fourth side surface **2221** when the electronic device **200** changes from the slide-in state to the slide-out state. That is, in the slide-in state, the second side surface **2122** and the fifth side surface **2222** completely cover the space between the second plate **221** and the first portion **231** of the flexible display **230**. However, when the first housing **210** is moved, the second side surface **2122** moves, creating the clearance space between the fifth side surface **2222** and the first portion **231** of the flexible display **230**.

Hereinafter, the clearance will be referred to as a "clearance space (e.g., a third space)". The clearance space **2003** may be connected to the second space **2002**, and foreign matter flowing into the clearance space **2003** in the slide-out state may cause a malfunction of the electronic device **200** by flowing into the second space **2002** and the first space **2001**.

According to an exemplary embodiment, the electronic device **200** may include a clearance compensation structure **300** provided in order to close the clearance space **2003** (e.g., a clearance portion) generated in the first housing **210** in the open state. The clearance compensation structure **300** may be disposed in the second space **2002** when the electronic device **200** is in the slide-in state and configured to be moved from the second space **2002** to the clearance space **2003** when the electronic device **200** is slide-out state. For

example, the clearance compensation structure **300** may be configured to operate in cooperation with the movement of the first housing **210**.

Hereinafter, the operation relationship of the clearance compensation structure **300** according to the operation of the electronic device will be described in detail.

FIG. **6**A is a cross-sectional view of the electronic device **200** taken along line **6**A-**6**A in FIG. **5**A. FIG. **6**B is a cross-sectional view of the electronic device **200** taken along line **6**B-**6**B in FIG. **5**A. FIG. **7**A is a cross-sectional view of the electronic device **200** taken along line **7**A-**7**A in FIG. **5**B. FIG. **7**B is a cross-sectional view of the electronic device **200** taken along line **7**B-**7**B in FIG. **5**B. FIG. **8**A is a perspective view illustrating the front side of the clearance compensation structure **300** of FIG. **5**B, and FIG. **8**B is a perspective view illustrating the rear side of the clearance compensation structure **300** of FIG. **5**B.

Referring to FIG. **6**A, in the slide-in state of the electronic device **200**, substantially all of the first housing **210**, except for the first side **2121**, may be maintained in the state of being inserted into the second space **2002** of the second housing **220**. In the slide-in state of the electronic device **200**, the pinion gear **262** of the drive unit **260** fixed in the first space **2001** between the first guide plate **240** and the first plate **211** of the first housing **210** may mesh with a rack gear **252** disposed on the rear surface of the second guide plate **250** of the second housing **220**. In this case, only the first portion **231** of the flexible display **230** may be exposed to the outside, and the second portion **232** may be introduced into the first space **2001** while being supported by the rollable module **270**.

According to certain embodiments, the electronic device **200** may include a rollable module **270** disposed in the first space **2001** and the second space **2002** so as to support the flexible display **230**. The rollable module **270** may include a plurality of bars connected to each other so as to be bent, and may be disposed so as to be at least partially wound on a first support shaft **271** disposed in the first space **2001** and a second support shaft **272** disposed in the second space **2002** and then to support the rear surface of the flexible display **230**. The rollable module **270** may provide rigidity for display operation by supporting the rear surface of the flexible display **230**. The first support shaft **271** and the second support shaft **272** may be connected by an elastic retention member **273** for maintaining elasticity of the flexible display **230**.

Referring to FIG. **6**B and FIGS. **8**A and **8**B, in the slide-in state, the clearance compensation structure **300** may be disposed to be regulated by the second side surface **2122** in the second space **2002**. The clearance compensation structure **300** may include a guide block **310** disposed to be movable from the second space **2002** to the clearance space **2003**, and a plurality of springs S**1** configured to press the guide block **310** toward the clearance space **2003**. The guide block **310** may include a body **311** having a predetermined length, and an engagement portion **312** formed to be engaged with an engagement step **223** formed in the second housing **220**. In an embodiment, with the engagement structure in which the engagement portion **312** is engaged with the engagement step **223**, the guide block **310** might not completely depart from the second space **2002**. According to an embodiment, the guide block **310** includes recesses **314** formed in the surface facing the coil springs S**1**, and the coil springs S**1** are partially received in the recesses **314**, respectively, thereby being prevented from being arbitrarily disengaged from the guide block **310**. According to an embodiment, the guide block **310** may include an inclined portion **313** formed in an area corresponding to an end portion of the second side surface **2122** of the first housing **210**. According to an embodiment, the inclined portion **313** may be formed to have an inclined angle capable of moving the guide block **310** from the clearance space **2003** to the second space **2002** by being pressed by an end of the second side surface **2122**. According to an embodiment, the guide block **310** may have the same material and/or the same color as the first housing **210** and the second housing **220**. According to another embodiment, the guide block **310** may have a material (e.g., a metal material) and/or a color different from those of the first housing **210** and the second housing **220**.

Referring to FIG. **7**A, when the electronic device **200** is switched from the slide-in state to the slide-out state, the processor of the electronic device **200** may control the driving unit **260** to rotate the pinion gear **262**. In this case, through the pinion gear **262** rotating on the engaged rack gear **252**, the first housing **210** may be moved in a first direction (direction ①). At the same time, via the rollable module **270**, the second portion **232** of the flexible display **230** introduced into the first space **2001** may be disposed to be exposed to the outside by extending from the first portion **231**.

Referring to FIG. **7**B, when the electronic device **200** is switched from the slide-in state to the slide-out state, the second side surface **2122** is also moved together with the first housing **210** and is regulated by the second side surface **2122**, and the guide block **310** disposed in the second space **2002** protrudes in the second direction (direction ②) toward the clearance space **2003** by being pressed by the coil springs S**1**, whereby the clearance space **2003** can be closed. Accordingly, foreign matter flowing into the clearance space **2003** may be blocked by the guide block **310** of the clearance compensation structure **300**.

According to certain embodiments, the guide block **310** may include a magnetic force generation member M**1** (or magnet) disposed in a region adjacent to an end of the second side surface **2122**. According to an embodiment, the first housing **210** may include a magnetic force reaction member M**2** disposed at a position affected by the magnetic force (e.g., attractive force) of the magnetic force generation member M**1** in the second side surface **2122**. According to an embodiment, the magnetic force generation member M**1** may include a magnet. According to an embodiment, the magnetic force reaction member M**2** may include a metal member or another magnet that responds to the magnetic force of the magnet. According to an embodiment, in the state in which the electronic device **200** is opened, the magnetic force generation member M**1** is disposed at a position that affects the magnetic force reaction member M**2**, thereby preventing the guide block **310** introduced into the clearance space **2003** from accidentally moving or moving into the second space **2002**. In another embodiment, the magnetic force generation member M**1** may be disposed on the second side surface **2122**, and the magnetic force reaction member M**2** may be disposed on the guide block **310**.

FIG. **9** is a view illustrating the operation of the clearance compensation structure **310** of FIG. **5**B.

Referring to FIG. **9**(*a*), when the electronic device **200** is switched from the slide-in state to the slide-out state, the guide block **310** of the clearance compensation structure **300** may be disposed parallel to the second side surface **2122** of the first housing **210** and may close the clearance space **2003**. According to an embodiment, the second side surface **2122** may have an inclined surface **2122***a* corresponding to the inclined portion **313** of the guide block **310**. According to an embodiment, in the state in which the electronic device

200 is opened, the inclined surface 2122*a* of the second side surface 2122 and the inclined portion 313 of the guide block 310 may be in surface contact with each other, thereby closing the clearance space 2003. According to an embodiment, the inclined portion 313 and the inclined surface 2122*a* may be at least partially in surface contact with flat surfaces, or at least partially in surface contact with curved surfaces.

Referring to FIG. 9(*b*), when the first housing 210 is moved in the closing direction (direction ①') via the driving unit 260, the inclined surface 2122*a* of the side surface 2122 may press the inclined portion 313 of the guide block 310. In this case, through the linear movement and the inclined structure of the second side surface 2122, the guide block 310 may be moved downward (toward the second space).

Referring to FIG. 9(*c*), when the first housing 210 is further moved in the closing direction (direction ①'), the inclined surface 2122*a* of the second side surface 2122 completely rides over the inclined portion 313 of the guide block 310, and the state in which the bottom surface of the second side surface 2122 presses the top surface of the guide block 310 may be changed. Thereafter, through the continuous movement of the first housing 210, the guide block 310 may be moved to the second space 2002 in the second housing 220, and the second side surface 2122 of the first housing 210 and the fifth side surface 2222 of the second housing 220 may be switched to the slide-in state in which the that the second side surface 2122 and the fifth side surface 2222 are seamlessly coupled.

FIG. 10A is a cross-sectional view illustrating the electronic device 200 including the clearance compensation structure 300 according to certain embodiments in the slide-in state, and FIG. 5B is a cross-sectional view illustrating the electronic device 200 including the clearance compensation structure 300 according to certain embodiments in the slide-out state. FIG. 11A is a perspective view illustrating the front side of the clearance compensation structure of FIG. 10A, and FIG. 11B is a perspective view illustrating the rear side of the clearance compensation structure of FIG. 10A.

In describing the components of the electronic device 200 of FIGS. 10A and 10B, the same reference numerals are given to components that are substantially the same as those of the electronic device 200 of FIGS. 6B and 7B, and a detailed description thereof may be omitted.

Referring to FIGS. 10A to 11B, as the elastic member supporting the guide block 310 of the clearance compensation structure 300, a plate-shaped spring S2 may be used instead of the coil springs S1. In this case, the rear surface of the guide block 310 of the clearance compensation structure 300 may include a recess 315 for supporting the both ends of the plate-shaped spring S2. According to an embodiment, since the plate-shaped spring S2 is supported by the recess 315 while retaining elasticity, the plate-shaped spring S2 can be prevented from accidentally departing from the second space 2002.

According to certain embodiments, the clearance compensation structure 300 is applied in order to close the clearance space 2003 (e.g., a clearance portion) formed between the second side surface 2122 of the first housing 210 and the fifth side surface 2222 of the second housing 220, but is not limited thereto. For example, it is obvious that, in the state in which the electronic device 200 is opened, the clearance compensation structure 300 can be used in order to close the space formed between the third side surface 2123 of the first housing 210 and the sixth side surface 2223 of the second housing 220.

According to another embodiment, the clearance space 2003 is not limited to the clearance space 2003 (e.g., a clearance portion) formed between the second side surface 2122 of the first housing 210 and the fifth side surface 2222 of the second housing 220. For example, when such a clearance portion occurs in another guide structure exposed to the outside of the two housings 210 and 220, the clearance compensation structure 300 according to an exemplary embodiment may be applied in order to close the clearance portion. In addition, besides the coil springs (S1) and the plate-shaped spring (S2), the elastic member according to an exemplary embodiment may be replaced with at least one known elastic member (e.g., an elastic clip, an elastic pogo pin structure, or an elastic material such as rubber or silicone).

FIG. 12A is a view illustrating the configuration of the electronic device 200 including the clearance compensation structure 400 according to certain embodiments in the slide-in state, and FIG. 12B is a view illustrating the configuration of the electronic device 200 including the clearance compensation structure 300 according to certain embodiments in the slide-out state.

In describing the components of the electronic device 200 of FIGS. 12A and 12B, the same reference numerals are given to components that are substantially the same as those of the electronic device 200 of FIGS. 6B and 7B, and a detailed description thereof may be omitted.

The guide block 310 of the clearance compensation structure 300 described above may be configured to move in the second space 2002 in a second direction (direction ②) (e.g., the z-axis direction in FIG. 4A) perpendicular to the first direction (direction ①) in which the first housing 210 is opened so as to close the clearance space 2003.

Referring to FIGS. 12A and 12B, in the state in which the electronic device 200 is closed, the guide block 410 of the clearance compensation structure 400 may be disposed in the second space 2002 in the second housing 220 while being regulated by the second side surface 2122 of the first housing 210. In this case, the guide block 410 may be supported via a coil spring S1 or a plate-shaped spring (e.g., the plate-shaped spring S2 in FIG. 11A). According to an embodiment, the clearance compensation structure 400 may be configured to operate in cooperation with the movement of the first housing 210. According to an embodiment, the guide block 410 may include an inclined portion 413 formed in an area corresponding to an end portion of the second side surface 2122 of the first housing 210. According to an embodiment, when the electronic device 200 is switched from the slide-out state to the slide-in state, the inclined portion 413 may be formed to have an inclined angle capable of moving the guide block 410 from the clearance space 2003 to the second space 2002 by being pressed by an end of the second side surface 2122. According to an embodiment, the second side surface 2122 may have an inclined surface 2122*b* corresponding to the inclined portion 413 of the guide block 410. According to an embodiment, in the state in which the electronic device 200 is opened, the inclined surface 2122*a* of the second side surface 2122 and the inclined portion 413 of the guide block 410 may be in surface contact with each other.

According to certain embodiments, in the slide-out state, the guide block 410 of the clearance compensation structure 400 may be configured to move in a third direction (direction ③) (e.g., the y-axis direction) perpendicular to the first direction (direction ①) in which the first housing 210 is opened and the second direction (e.g., the z-axis direction) in which the flexible display 230 is directed, so as to close

the clearance space **2003**. This may be a modified configuration which may be considered with the same closing effect as that described above when the spatial design for moving the guide block **410** in the second direction (e.g., the z-axis direction) in the second space **2002** is not easy.

FIG. **13**A is a view illustrating, in a partially cross-sectional view, the configuration of an electronic device **200** including a clearance compensation structure **500** according to certain embodiments in the slide-in state, and FIG. **13**B is a view illustrating, in a partially cross-sectional view, the configuration of the electronic device **200** including the clearance compensation structure **500** according to certain embodiments in the slide-out state.

In describing the components of the electronic device **200** of FIGS. **13**A and **13**B, the same reference numerals are given to components that are substantially the same as those of the electronic device **200** of FIGS. **6**B and **7**B, and a detailed description thereof may be omitted.

Referring to FIGS. **13**A and **13**B, the electronic device **200** may include a first housing **210** and a second housing **220** that is coupled to be movable relative to the first housing **210**. According to an embodiment, the housing **210** may include a guide rib **215** having a predetermined length and disposed adjacent to the second side surface **2122**. According to an embodiment, the second housing **220** may include a guide rail **225** into which the guide rib **215** is inserted and which guides the inserted guide rib **215**. Accordingly, the first housing **210** may perform a switching operation to the slide-out state or the slide-in state with respect to the second housing **220** by the guide structure using the guide rib **215** and the guide rail **225**.

According to certain embodiments, the electronic device **200** may include a clearance compensation structure **500** for closing the clearance space **2003** (e.g., a clearance portion) generated by the first housing **210** spaced apart from the second housing **220** in the slide-out state. According to an embodiment, the clearance compensation structure **500** may include a rotation roller **510** disposed in at least a portion of the second space **2002** of the housing **220** and a band-shaped blocking member **520** or **530** one end of which is at least partially wound on the rotation roller **510** and the other end of which fixed to an end of the second side surface **2122** of the first housing **210**. According to an embodiment, the rotation roller **510** may be disposed in the second space **2002** of the second housing **220** to be rotatable to wind the blocking member **520** or **530** in response to the opening/closing operation of the first housing **210**.

Unlike the above-described configuration that closes the clearance space **2003** only when the first housing **210** is completely opened, the clearance compensation structure **500** according to the exemplary embodiments is capable of adaptively closing at least a portion of the clearance space **2003** even when the first the first housing **210** is moving. Thus, the clearance compensation structure **500** may be advantageously applied to a rollable electronic device of a manually opened/closed type in which the first housing **210** is partially opened from the second housing **220**.

FIG. **14**A is a perspective view illustrating the clearance compensation structure **500** of FIG. **13**A. FIG. **14**B is a view illustrating the operation state of the clearance compensation structure **500** of FIG. **14**A according to the opening/closing operation of the electronic device according to certain embodiments.

Referring to FIGS. **14**A and **14**B, the clearance compensation structure **500** may include a rotation roller **510**, and a blocking member **520** one end of which is wound on the rotation roller **510** and the other end of which is fixed to the second side surface **2122** of the first housing **210**. According to an embodiment, the blocking member **520** may include a film of a polymer material or a metal material. In an embodiment, when the second side surface **2122** moves in the opening direction (direction ①), the rotation roller **510** may rotate in a clockwise direction (direction ④'), and when the second side surface **2122** moves in the closing direction (direction ①'), the rotation roller **510** may be rotated in a counterclockwise direction (direction ④). In this case, the rotation roller **510** may be always pressed in the direction in which the blocking member is wound (direction ④) via a torsion spring **511**. Accordingly, the blocking member **520** may always maintain tight elasticity according to the opening/closing operation of the first housing **210** with respect to the second side surface **2122** of the rotation roller **510**.

FIG. **15**A is a perspective view illustrating the clearance compensation structure **500** of FIG. **13**A. FIG. **15**B is a view illustrating the operation state of the clearance compensation structure **500** of FIG. **15**A according to the opening/closing operation of the electronic device **200** according to certain embodiments.

Referring to FIGS. **15**A and **15**B, the blocking member **530** may include a film **531** and a plurality of support blocks **532** attached to the top surface of the film **531** at regular intervals. According to an embodiment, the film **531** and the support blocks **532** may be wound together on the rotation roller **510** through the rotation of the rotation roller **510**, and when the second side surface **2122** is moved in the opening direction (direction (D), the film **531** and the support block **532** may block the clearance space **2003** together. In this case, a more reinforced rigid structure may be provided through the blocking member **530** including the plurality of support blocks **532**.

FIG. **16**A is a view illustrating the configuration of a clearance compensation structure **600** operating in cooperation with the opening/closing operation of the electronic device according to certain embodiments; and FIG. **16**B is a view illustrating the configuration of a clearance compensation structure **600** operating in cooperation with the opening/closing operation of the electronic device according to certain embodiments.

Referring to FIGS. **16**A and **16**B, the clearance compensation structure **600** may include a plurality of guide blocks **610** arranged to be supported by the second housing (e.g., the second housing **220** in FIG. **4**A) in the second space **2002**. According to an embodiment, each of the plurality of guide blocks **610** may be pressed toward the clearance space **2003** through corresponding one of coil springs S**1**. Although not illustrated, each of the plurality of guide blocks **610** has an engagement structure (e.g., the engagement portion **312** and the engagement step **223** in FIG. **6**B) described above, thereby being prevented from departing from the second housing **220**.

According to certain embodiments, each of the plurality of guide blocks **610** may include an inclined portion **611** corresponding to the inclined surface **2122***a* formed at an end of the second side surface **2122**. According to an embodiment, the plurality of guide blocks **610** are substantially in contact with each other, but may be arranged to operate individually without interlocking with each other. According to an embodiment, when the second side when **2122** is moved in the opening direction (direction ①) or in the closing direction (direction ①'), among the plurality of the guide block **610**, only the guide blocks **610** corresponding to the movement amount of the second side surface **2122** are introduced into the second space **2002**, and the remain-

ing guide blocks **610** close the remaining space in the clearance space **2003**. Thus, even during the operation of switching from the slide-out state to the slide-in state or from the slide-in state to the slide-out state, the plurality of guide blocks **610** can help to adaptively close a clearance portion between the slide-out state and the slide-in state.

According to certain embodiments, in the slide-out state, by providing a clearance compensation structure for compensating for a clearance generated between two housings, it is possible to prevent inflow of foreign matter, and thus to help to secure the operational reliability of the rollable electronic device.

According to certain embodiments, an electronic device (e.g., the electronic device **200** in FIG. **4**A) may include housings, a flexible display, and a clearance compensation structure. The housings may include: a first housing (e.g., the first housing **210** in FIG. **4**A) including a first plate (e.g., the first plate **211** in FIG. **4**A) including a first surface (e.g., the first surface **2101** in FIG. **4**A) and a second surface (e.g., the second surface **2102** in FIG. **4**A) facing away from the first surface, and a first side frame (e.g., the first side frame **212** in FIG. **4**A) forming a first space (e.g., the first space **2001** in FIG. **4**A) to surround at least a portion of the first plate; and a second housing (e.g., the second housing **220** in FIG. **4**A) including a second plate (e.g., the second plate **221** in FIG. **4**A) including a third surface (e.g., the third surface **2201** in FIG. **4**A) facing the same direction as the first surface and a fourth surface (e.g., the fourth surface **2202** in FIG. **4**A) facing away from the third surface, and a second side frame (e.g., the second side frame **222** in FIG. **4**A) forming a second space (e.g., the second space **2002** in FIG. **4**A) to surround at least a portion of the second plate. At least a portion of the first side frame of the first housing is coupled to at least a portion of the second side frame to be slidable in a first direction (e.g., direction ① in FIG. **5**B), and the first housing is disposed to be movable between a slide-out state and a slide-in state relative to the second housing. The flexible display (e.g., the flexible display **230** in FIG. **4**A) may include a first portion (e.g., the first portion **231** in FIG. **4**A) extending across at least a portion of the third surface, and a second portion (e.g., the second portion **232** in FIG. **4**A) extending from the first portion and located in the first space in the slide-in state of the first housing. When the first housing is switched from the slide-in state to the slide-out state, at least a portion of the second portion is exposed to an outside so as to form a substantially same plane as the first portion. The clearance compensation structure (e.g., the clearance compensation structure **300** in FIG. **4**A) may be disposed in the second space and may be configured to compensate for a clearance space (e.g., the clearance space **2003** in FIG. **5**B) generated in the second housing when the first housing is switched from the slide-in state to the slide-out state.

According to certain embodiments, the clearance compensation structure may include a guide block (e.g., the guide block **310** in FIG. **4**A) disposed to be movable between the second space and the clearance space, and an elastic member (e.g., the coil springs S**1** in FIG. **4**A) configured to press the guide block toward the third direction. In the slide-out state, the guide block may be moved to the clearance space by being pressed by the elastic member.

According to certain embodiments, the elastic member may include at least one of a coil spring, a plate-shaped spring, an elastic clip, or an elastic material such as rubber or silicone disposed between the guide block and the second housing in the second space.

According to certain embodiments, the guide block may include an inclined portion (e.g., the inclined surface **313** in FIG. **6**B) formed at a position facing a portion (e.g., the inclined surface **2122***a* in FIG. **6**B) of the first housing that is in contact with the guide block, and when the first housing is switched to the slide-in state, the guide block may be moved to the second space through an operation in which the portion of the first housing pushes the inclined portion.

According to certain embodiments, the portion of the first housing may include an inclined surface (e.g., the inclined surface **2122***a* in FIG. **6**B) correspondingly formed to be in surface contact with the inclined portion.

According to certain embodiments, a surface contact portion between the inclined portion and the inclined surface may at least partially include a flat surface or curved surface.

According to certain embodiments, the guide block may include a magnetic force generation member (e.g., the magnetic force generation member M**1** in FIG. **6**B), and the first housing may include a magnetic force reaction member (e.g., the magnetic force reaction member M**2** in FIG. **6**B) disposed in a region in which the magnetic force reaction member is affected by magnetic force of the magnetic force generation member in the slide-out state.

According to certain embodiments, in the slide-out state, the guide block may maintain a position thereof in the clearance space via the magnetic force reaction member affected by the magnetic force of the magnetic force generation member.

According to certain embodiments, the magnetic force generation member may include a magnet, and the magnetic force reaction member may include a magnet or a metal member affected by the magnetic force.

According to certain embodiments, in the slide-out state, the guide block may be moved from the second space to the clearance space in a second direction (e.g., direction ② in FIG. **7**B) perpendicular to the first direction.

According to certain embodiments, in the slide-out state, the guide block (e.g., the guide block **410** in FIG. **12**B) may be moved from the second space to the clearance space in a third direction (e.g., third direction ③ in FIG. **12**B) perpendicular to the first direction and the second direction.

According to certain embodiments, the electronic device may further include a first guide plate (e.g., the first guide plate **240** in FIG. **4**A) disposed in the first space to correspond to the first surface and including at least one guide protrusion (e.g., the guide protrusion **241** in FIG. **4**A), and a second guide plate (e.g., the second guide plate **250** in FIG. **4**A) disposed in the second space to correspond to the third surface and including at least one guide slit (e.g., the guide slit **251** in FIG. **4**A). The first housing may be opened/closed from the second housing through a method in which the guide protrusion of the first guide plate is guided to the guide slit in the second guide plate.

According to certain embodiments, the electronic device may further include a driving unit (e.g., the driving unit **260**) disposed between the first plate and the first guide plate in the first space, and including at least one driving motor (e.g., the driving motor **261** in FIG. **4**A) and a pinion gear (e.g., the pinion gear **262** in FIG. **4**A) installed to be rotated via the driving motor. The pinion gear may be disposed to mesh with a rack gear (e.g., the rack gear **252** in FIG. **6**A) formed on the second guide plate, and the first housing is automatically opened/closed from the second housing through a method in which the pinion gear is rotated on the rack gear.

According to certain embodiments, the electronic device may further include a guide rib (e.g., the guide rib **215** in FIG. **13**A) formed in at least a portion of the first side frame,

and a guide rail (e.g., the guide rail **225** in FIG. **13**A) formed on at least a portion of the second side frame and configured to guide the guide rib, and the clearance space may be generated due to separation between the guide rib and the guide rail in the slide-out state.

According to certain embodiments, the clearance compensation structure (e.g., the clearance compensation structure **500** in FIG. **13**A) may include a rotation roller (e.g., the rotation roller **510** in FIG. **13**A) rotatably disposed in the second space, and a band-shaped blocking member (e.g., the blocking member **520** or **530** in FIG. **13**A) wound on the rotation roller at one end and fixed to at least a portion of the first housing at the other end. During switching from the slide-in state to the slide-out state, the blocking member wound on the rotation roller may be moved to block the clearance space according to the movement of the first housing.

According to certain embodiments, the blocking member (e.g., the blocking member **520** in FIG. **14**B) may include a film formed of a polymer or a metal material.

According to certain embodiments, the electronic device may further include a plurality of support blocks (e.g., the support blocks **532** in FIG. **15**B) arranged at regular intervals on the top surface of the film (e.g., the film **531** in FIG. **15**B).

According to certain embodiments, the rotation roller may further include an elastic member (e.g., the torsion spring **511** in FIG. **14**B) configured to press the blocking member in a direction in which the blocking member is to be wound.

According to certain embodiments, the clearance compensation structure (e.g., the clearance compensation structure **600** in FIG. **16**A) may include a plurality of guide blocks (e.g., the plurality of guide blocks **610** in FIG. **16**A) disposed to be individually movable between the second space and the clearance space, and a plurality of elastic members (e.g., the coil springs S**1** in FIG. **16**A) each configured to individually press corresponding one of the plurality of guide blocks toward the third direction.

According to certain embodiments, each of the plurality of guide blocks may include an inclined portion (e.g., the inclined portion **611** in FIG. **16**A) formed at a position facing a portion (e.g., the inclined portion **2122***a* in FIG. **16**A) of the first housing that is in contact with each of the plurality of guide blocks, and when the first housing is switched from the slide-in state to the slide-out state or from the slide-out state to the slide-in state, each of the plurality of guide blocks may be individually moved to the second space through an operation in which the portion of the first housing pushes the inclined portion.

Certain embodiments of the disclosure disclosed in this specification and drawings are provided merely to easily describe the technical contents of the disclosure and to help understanding of the embodiments of the disclosure, and are not intended to limit the scope of the disclosure. Accordingly, the scope of the certain embodiments of the disclosure should be construed in such a manner that, in addition to the embodiments disclosed herein, all changes or modifications derived from the technical idea of the certain embodiments of the disclosure are included in the scope of the certain embodiments of the disclosure.

What is claimed is:

1. An electronic device comprising:

a first housing comprising a first plate having a first surface and a second surface facing away from the first surface, and a first side frame forming a first space and at least partially surrounding the first plate; and

a second housing comprising a second plate comprising a third surface facing a same direction as the first surface and a fourth surface facing away from the third surface, and a second side frame forming a second space and at least partially surrounding the second plate,

wherein at least a portion of the first side frame of the first housing is coupled to at least a portion of the second side frame to be slidable in a first direction, and the first housing movable between an slide-out state and a slide-in state relative to the second housing;

a flexible display comprising:

a first portion extending across at least a portion of the third surface; and

a second portion extending from the first portion and located in the first space in the slide-in state of the first housing,

wherein, when the first housing is switched from the slide-in state to the slide-out state, at least a portion of the second portion is exposed to an outside so as to form a substantially same plane as the first portion; and

a clearance compensation structure disposed in the second space and configured to at least partially cover a clearance space generated between the second side frame and the flexible display when the first housing is switched from the slide-in state to the slide-out state.

2. The electronic device of claim **1**, wherein the clearance compensation structure comprises:

a guide block disposed to be movable between the second space and the clearance space; and

an elastic member configured to press the guide block toward a third direction, and

wherein, in the slide-out state, the guide block is moved to the clearance space by being pressed by the elastic member.

3. The electronic device of claim **2**, wherein the elastic member comprises at least one of a coil spring, a plate-shaped spring, an elastic clip, or an elastic material such as rubber or silicone disposed between the guide block and the second housing in the second space.

4. The electronic device of claim **2**, wherein the guide block comprises an inclined portion formed at a position facing a portion of the first housing that is in contact with the guide block, and

when the first housing is switched to the slide-in state, the guide block is retracted into the second space, wherein the portion of the first housing pushes the inclined portion.

5. The electronic device of claim **4**, wherein the portion of the first housing includes an inclined surface correspondingly formed to be in surface contact with the inclined portion.

6. The electronic device of claim **5**, wherein a surface contact portion between the inclined portion and the inclined surface at least partially comprises a flat surface or curved surface.

7. The electronic device of claim **2**, wherein the guide block comprises a magnet, and

the first housing comprises magnetic material disposed in a region in which the magnetic material is affected by magnetic force of the magnet in the slide-out state.

8. The electronic device of claim **7**, wherein, in the slide-out state, the magnetic force causes the guide block to maintains a position at least partially closing the clearance space.

9. The electronic device of claim **7**, wherein the magnetic material comprises another magnet or a metal member affected by the magnetic force.

10. The electronic device of claim 2, wherein, in the slide-out state, the guide block is moved from the second space to at least partially cover the clearance space in a second direction substantially perpendicular to the first direction.

11. The electronic device of claim 10, wherein, in the slide-out state, the guide block is moved from the second space to at least partially cover the clearance space in the third direction substantially perpendicular to the first direction and the second direction.

12. The electronic device of claim 1, further comprising:

a first guide plate disposed in the first space to correspond to the first surface and including at least one guide protrusion; and

a second guide plate disposed in the second space to correspond to the third surface and including at least one guide slit,

wherein the first housing is opened/closed from the second housing by guiding the guide protrusion of the first guide plate to the guide slit in the second guide plate.

13. The electronic device of claim 12, further comprising:

a driving unit disposed between the first plate and the first guide plate in the first space, and comprising at least one driving motor and a pinion gear installed to be rotated via the driving motor,

wherein the pinion gear is disposed to mesh with a rack gear formed on the second guide plate, and

wherein the first housing is automatically opened/closed from the second housing through a method in which the pinion gear is rotated on the rack gear.

14. The electronic device of claim 1, further comprising:

a guide rib formed in at least a portion of the first side frame; and

a guide rail formed on at least a portion of the second side frame and configured to guide the guide rib,

wherein the clearance space is generated due to separation between the guide rib and the guide rail in the slide-out state.

15. The electronic device of claim 1, wherein the clearance compensation structure comprises:

a rotation roller rotatably disposed in the second space; and

a band-shaped blocking member wound on the rotation roller at one end and fixed to at least a portion of the first housing at another end,

wherein during switching from the slide-in state to the slide-out state, the band-shaped blocking member is moved to at least partially block the clearance space according to movement of the first housing.

16. The electronic device of claim 15, wherein the blocking member comprises a film formed of a polymer or a metal material.

17. The electronic device of claim 16, further comprising:

a plurality of support blocks arranged at regular intervals on a top surface of the film.

18. The electronic device of claim 15, wherein the rotation roller further comprises an elastic member configured to press the blocking member in a direction in which the blocking member is to be wound.

19. The electronic device of claim 1, wherein the clearance compensation structure comprises:

a plurality of guide blocks disposed to be individually movable from the second space and to at least partially cover the clearance space; and

a plurality of elastic members each configured to individually press corresponding one of the plurality of guide blocks toward a third direction.

20. The electronic device of claim 19, wherein each of the plurality of guide blocks comprises an inclined portion formed at a position facing a portion of the first housing that is in contact with each of the plurality of guide blocks, and

when the first housing is switched from the slide-in state to the slide-out state or from the slide-out state to the slide-in state, each of the plurality of guide blocks is individually moved to the second space through an operation in which the portion of the first housing pushes the inclined portion.

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